AVIATION WEEK

NOV. 8, 1954

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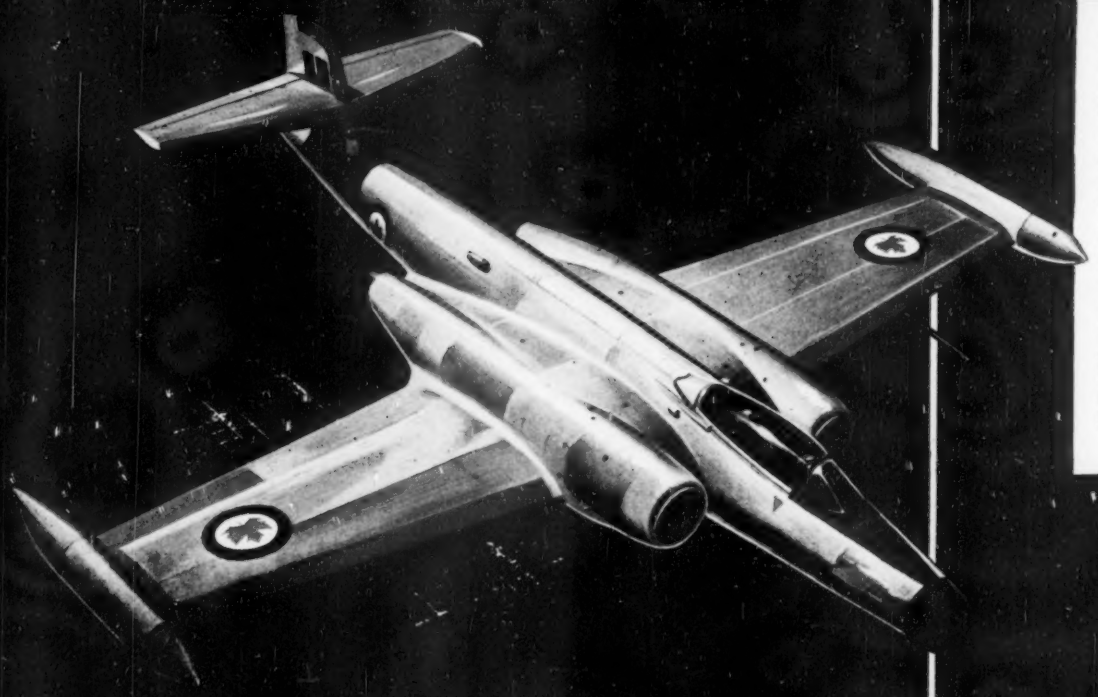

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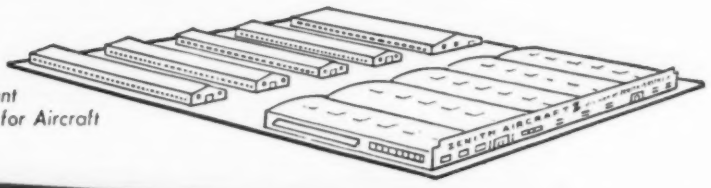

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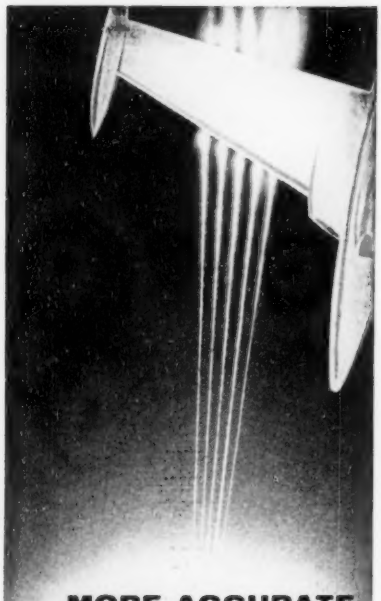

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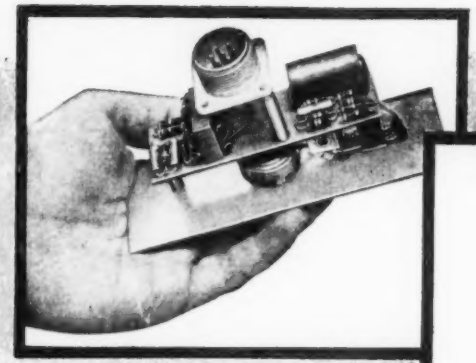

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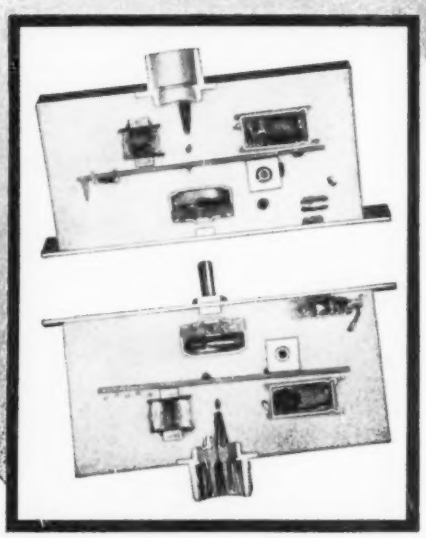

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NEWS DIGEST

Domestic

Convair XFY-VTO fighter made its first transition to horizontal flight after vertical takeoff last week at Brown NAS near San Diego, Calif. Convair test pilot J. F. "Skeets" Coleman went to horizontal flight at about 175 ft. altitude and made several highspeed passes across the field. He then hovered the XFY-1 and backed it down to a successful landing on its tail. Flight totaled 21 min., marked first time any VTO has been flown through complete cycle from vertical to horizontal and return to vertical.

First YH-16. Piasecki Helicopter Corp.'s 40-passenger, twin-engine copter, will be converted from piston to turbine power under a new USAF contract. The engines will be of higher power than the Allison turbines in the YH-16A (AVIATION WEEK May 24 p. 18).

Ramjet-powered H-32 will be put through Army field evaluation tests under a new order for an additional number of Hiller Helicopters' two-place, 500-lb. copter. Army, Navy and Marines are scheduled to take delivery by the end of this year on the first evaluation quantity ordered from the Palo Alto, Calif., company.

Safety mark of 12 months without a fatal accident was completed Oct. 31 by scheduled U. S. international airlines, Air Transport Assn. reports. During this period, the flag lines flew 2,670,000 passengers more than 3.6 billion miles.

Continental Air Lines will equip its fleet with airborne C-band radar for storm warning, expects to complete installations by next fall. CAL is the second domestic air carrier to announce plans for fleetwide radar use, following the lead of United Air Lines. On international routes, Panagra will use X-band radar in its new DC-7s.

Bell Aircraft Corp.'s Helicopter Division has received IRAN contract to inspect and repair 70 Army H-13 copters at Ft. Worth between now and next June.

Financial

Lockheed Aircraft Corp., Burbank, Calif., will increase its fourth quarter dividend from 50 to 60 cents and pay an extra 50 cents Dec. 11 to stockholders of record Nov. 19. A 5% stock dividend, one share for each 20 issued, will be paid Jan. 24 to holders of record Nov. 19. The company estimates earnings for the third quarter of 1954 at $6 million, compared with $6,056,000 for the second quarter and $4,808,000 for the first. Sales for the first nine months are expected to total more than $580 million. Backlog Sept. 30: $1,031,062,000.

First View of Navy FJ-4 Fury Jet Fighter

Powered by a Wright J65-W-4 turbojet of 7,800 lb. thrust, the first of two prototype North American Aviation FJ-4 Furies goes aloft on maiden flight at Port Columbus, Ohio, Oct. 28. Navy has ordered undisclosed number of the carrier-based fighters, to be delivered during 1955 and 1956. Latest in NAA Columbus Division's Fury series, the FJ-4 features numerous improvements over earlier models—such as new, thinner tail surfaces; mechanically drooped thin-wing leading edges and aileron-flaps, new landing gear and an external "spine" from the cockpit to dorsal fin.

McDonnell Aircraft Corp., St. Louis, had net earnings of $824,811 for the first quarter of fiscal 1955, dropping from $1,102,749 for the first three months of last year. Sales totaled $27,540,265, compared with $36,639,661. Company's backlog Sept. 30: $431,289,410.

Piasecki Helicopter Corp., Morton, Pa., has declared a 10% stock dividend, payable Nov. 22 on all shares of record Nov. 8.

R-R for AA?

C. R. Smith, president of American Airlines, and AA's senior vice president-finance W. J. Hogan were reported back in England again last week in connection with engines.

High air transport industry sources report Smith is seeking exclusive rights to a new and powerful Rolls-Royce turboprop engine. American's president recently has been prodding U. S. aircraft manufacturers to come up with suitable turboprop transports (Aviation Week Nov. 1, p. 9).

Smith is said to be interested in putting British turboprops on a new fleet of Douglas DC-7Cs.

Ryan Aeronautical Co., San Diego, will pay a regular 10-cent quarterly dividend plus an extra 10 cents Dec. 10 to stockholders of record Nov. 19.

International

Trans-Australia Airlines' first Vickers Viscount crashed and burned last week seconds after takeoff on a training flight from Mangalore Airport near Melbourne, killing three TAA pilots. Reports from Melbourne said the transport swung to the right after it became airborne and struck a tree.

Panair do Brasil has not canceled its order for four de Havilland Comet 2s and option on two Series 3s, reports the Society for British Aircraft Constructors. SBAC says the airline believes more firmly in the jet transport "now that it has learned the cause of the accidents to the Comet 1 and what steps are being taken . . . to improve future aircraft of this type."

Vickers Viscount 700D has been ordered by Hong Kong Airways, is scheduled for delivery in late 1956. Total value of the contract, including spares and an option on a second Viscount: approximately $1,813,500.

Scandinavian Airlines System's planned transpolar service has received speedy approval from Civil Aeronautics Board and President Eisenhower. SAS' three-year, temporary foreign air carrier certificate permits operations between terminal points Los Angeles and Stockholm/Oslo/Copenhagen with an intermediate stop in Greenland.

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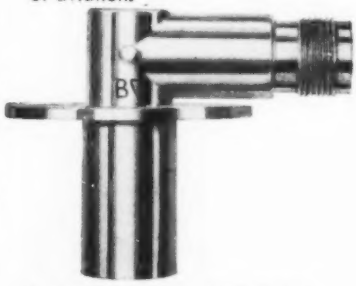

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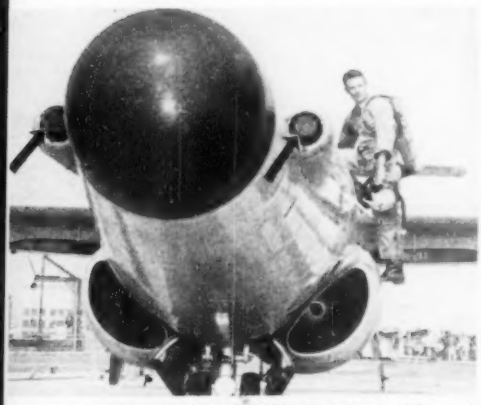
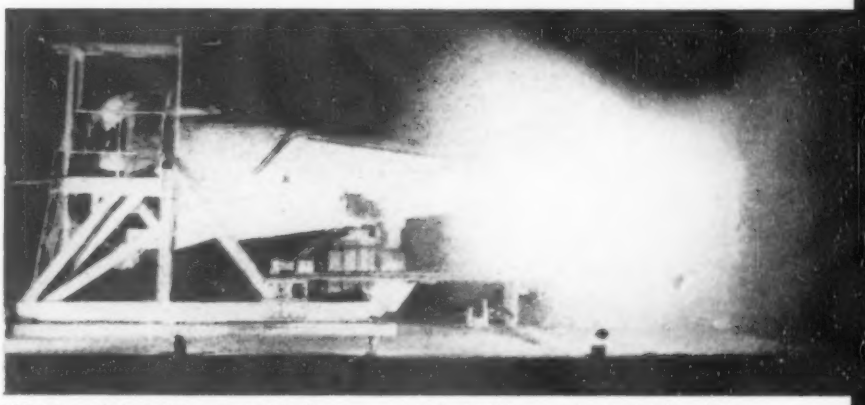
CUTLASS WITH CAMERAS, designated F7U-3P, has 25 in. longer nose than fighter versions and carries 104 flash flares for night photographs in the top of its twin jet intakes. The Cutlass normally carries multiple 20-mm. cannon above intakes.

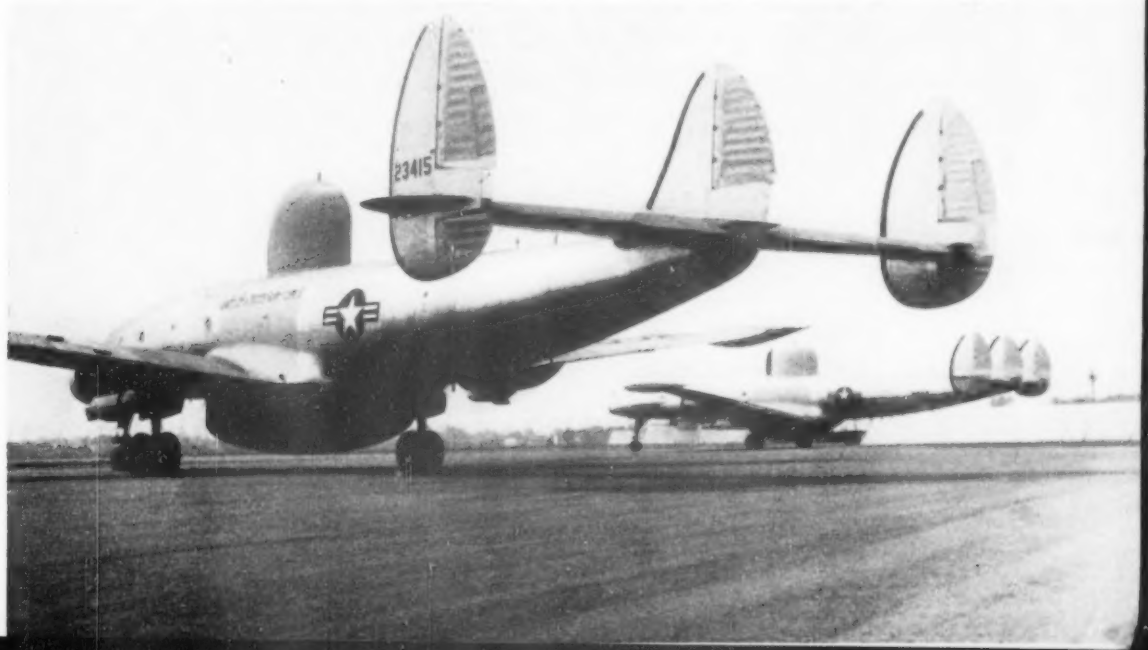
U. S. Shows New Weapons in Air Arsenal





AUTOMATIC ROCKET GUNS on either side of Northrop F-89C Scorpion test bed's nose are product of Armour Research Foundation. Developed under Army Ordnance contract, they are designated T-110 launchers. Units are tested on F-89 mockup in photo at right.

TWIN DELIVERY of early warning radar-equipped Super Constellations to Air Force (foreground) and Navy was made recently by Lockheed. Each plane carries six tons of avionics equipment. Wingtip tanks hold 1,200 gal. of extra fuel.



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WHO'S WHERE

In the Front Office

La Motte T. Cohu, former president and general manager of Convair, is new board chairman of Kay Lab, San Diego.

E. Clinton Towl, former vice president of Grumman Aircraft Engineering Corp., Bethpage, N. Y., has been elected administrative vice president. Other new vice presidents: **Robert L. Hall,** engineering; **William J. Hoffman,** manufacturing-engineering; **Charles Kingsley,** general counsel; **David Rittenhouse,** production, and **George F. Titterton,** contracts.

Rear Adm. J. S. Laidlaw (USN Ret.) has become staff assistant to the president of Hycon Manufacturing Co., Pasadena, Calif.

Earle M. Jorgensen, president and general manager of the Earle M. Jorgensen Co., has been elected a director of Northrop Aircraft, Inc., Hawthorne, Calif.

Donald H. McLaughlin, president of Homestake Mining Co., is a new member of the board of directors of Western Air Lines.

Changes

Arthur E. Harrison, former vice president-engineering for Wilcox Electric Co. and onetime chief engineer of Air Associates, has been appointed engineering director for Fairchild Engine & Airplane Corp.'s Guided Missiles Division, Wyandanch, N. Y.

N. A. Lamberti has joined Lear's LearCal Division, Santa Monica, Calif., as staff assistant to the vice president-general manager.

John W. Morrison has moved up from renegotiation administrator to comptroller of Minneapolis-Honeywell Co.'s Aeronautical Division, Minneapolis.

Robert G. Francis has been promoted to production engineering and materiel manager for Marquardt Aircraft Co., Van Nuys, Calif.

Robert W. Bowman is new chief industrial engineer for Aeroquip Corp., Jackson, Mich. **Kent R. Manning** has been appointed factory manager.

Rolfe Wyer has become comptroller for Solar Aircraft Co.'s San Diego plant.

Herbert M. Bradbury, development and engineering director for Aerodex, Inc., Miami, has taken on additional duties as customer service manager.

A. W. King has joined Control Products, Inc., Harrison, N. J., as sales manager.

Honors and Elections

Capt. K. J. G. Bartlett of Britain's Royal Aero Club is new president of the Federation Aeronautique Internationale, and **C. Sillevaerts** of Belgium has been elected first vice president. New vice presidents: **Jacqueline Cochran,** U. S.; **M. Jacques Allez,** France; **Luis F. Ardois,** Cuba; **Dr. W. Muri,** Suisse; **Mustafa Zeren,** Turkey; **C. Kolff,** Holland; **Maj. R. H. Mayo,** U. K.; **Gen. N. del Duca,** Italy; **Francisco Gutierrez Delgado,** Spain; **Capt. John Foltmann,** Denmark; **Branko Ivanus,** Yugoslavia; **E. Stepanov,** Russia; **Maj. Oscar von Reichel von Erlenhorst,** Austria, and **Lt. Col. C. Theophilis,** Greece.

INDUSTRY OBSERVER

► USAF investigators believe George Welch, North American Aviation test pilot, was fatally injured before he left the cockpit of his disintegrating F-100 Super Sabre. He apparently was struck by pieces of the plane as it broke up. Air Force investigation indicates he did not use the ejection seat but was sucked out of the cockpit with his chute opened by the slipstream. Cause of the accident, which occurred during pullout from a supersonic dive, has not been determined.

► Lockheed's turboprop YC-130 recently made an emergency landing at Palmdale with two of its Allison YT56 turboprops feathered. Feathering of No. 1 and No. 2 engines followed fluctuating fuel pressure, traced to faulty fuel heater. The turboprop transport has made more than seven flights since then without further trouble. Test pilots report stall characteristics are excellent, an important factor in view of short-runway use planned for the C-130.

► Air Force has been testing a specially modified Lockheed P2V-5 Neptune at Eglin AFB. USAF is interested in the short-field performance of the Neptune, a Navy sub hunter. Lockheed engineering test pilot Stan Beltz and an Air Force pilot narrowly escaped injury when the aircraft crashed and burned at Eglin recently.

► Rolls-Royce is continuing its penetration of the American aircraft engine market with the sale of late-model Avon turbojets to USAF for use in the Ryan delta-wing VTO project.

► North American F-100C Super Sabre will be equipped for aerial refueling operations.

► C. R. Smith last week confirmed (Aviation Week Nov. 1, p. 11) that he has been conferring with Lockheed, Douglas and Convair on development of a turboprop transport for American Airlines as a replacement for its Convair 240 fleet. Smith said American is preparing detailed specification for its new turboprop transport requirements but that generally it must carry 50 or more passengers, have four engines, cruise between 325 and 350 mph. and operate more economically than present piston-engine transports. Smith wants to put this transport in service by 1958.

► Light helicopters for target spotting and reconnaissance work may be armed with rocket packs for defense against ground fire, currently the most effective opposition encountered by the helicopter.

► One solution to the problem of released bombs hung up in the bomb-bay of a highspeed plane by aerodynamic forces is a spoiler, deflecting like a dive brake ahead of the bomb-bay. Douglas El Segundo is one manufacturer trying such a solution on a modified A3D Skywarrior.

► Pan American World Airways' Douglas DC-7Cs on order will be placed almost entirely in high-density-seating, tourist-class service. The carrier's fleet of Boeing Stratocruisers, held as the best airplane for passenger comfort, will continue to handle greatest portion of first-class service, since the installation of improved turbo-superchargers and extra wing tanks is expected to enable PAA to operate trans-Atlantic nonstop Stratocruiser service about 85% of the time.

► Radar transponder beacon program is expected to get a high priority in Civil Aeronautics Administration as a result of recent Air Transport Assn. letter assuring airline support. ATA suggests five East Coast airports be equipped with military ground interrogators in the next year to accelerate airline fleetwide installations. Meanwhile, Air Navigation Development Board has made plans for fleetwide transponder beacon service-test installation on seven Lake Central Airlines DC-3s. LCA operates into Indianapolis and Dayton where ground interrogators already are installed.

Washington Roundup

1955 Air Show Future

Ben Franklin, general manager of the National Aircraft Show, conferred recently with chamber of commerce officials at Ft. Worth, Tex., attempting to get a firm invitation from that city to hold the 1955 show at Ft. Worth's new and not-too-busy airport. He did not meet directly with Amon Carter, but the town's leading citizen was expected to give his blessing to the idea.

Once that is obtained, three other stumbling blocks remain:

(1) Franklin wants the city to put up $50,000.

(2) Dallas, nearby and rival city with a bad taste for Ft. Worth's competitive airport, must co-operate.

(3) The Defense Department must lend support. Money is not hard to come by in Texas but winning the heart and cash of Dallas for a lot of publicity that will be datelined Ft. Worth, Texas, may not be so easy. In addition, Defense Department policy on the air show still may be altered. Question now is up for consideration at top Pentagon levels. Franklin, on his visit to Texas, told chamber of commerce officials that Air Force Secretary Harold E. Talbott is eager to move the show next year to the Dallas-Ft. Worth area.

Combination Service Trend

Combination-class service on international airlines may be losing more friends for the carriers than it is gaining, according to reports filed by several airlines with the International Air Transport Assn. Companies state that restrictions between the two classes are becoming increasingly harder to enforce and that the tourist sections consistently are "oversold" while first-class seats go begging.

The trend continues to swing toward establishment of all-tourist class flights as the standard class for airlines with all other flights operating as luxury services.

Tougher Certification

Testimony at the Comet inquiry in London is confirming Civil Aeronautics Administration attitude of several years ago that British Air Registration Board did not require sufficiently stringent tests for airworthiness certification of British transports. Comet crash inquiry indicates ARB tests did not cover full range of Comet problems.

Watch for CAA to stiffen its attitude on any British requests to ease turboprop or turbojet civil transport safety requirements.

Atomic Shuffle

Navy recently reinstated its atomic-powered aircraft carrier project canceled by Defense Secretary Charles E. Wilson a year ago. Meanwhile, Army admits it has stopped manufacture of atomic cannon and will rely on guided missiles to deliver its atomic shells in future. USAF still is fighting a rearguard action against further Army encroachment into the missile field.

Aid for Japan

Japan's aircraft industry probably will receive upwards of $40 million in aid from the United States, according to high Japanese officials now here preparing for Prime Minister Yoshida's state visit. Most of the assistance would come out of a pile of Japanese yen currency bulging in U. S. government accounts in Tokyo. Japan wanted to use the money, accumulated from sales of surplus American wheat, to build destroyers for Japan's incipient navy.

With a depression plaguing American shipyards, the U. S. informally suggested that it would be inappropriate to spend this money on Japanese-built vessels and that the U. S. would look favorably on expenditures in Japan's aircraft industry instead.

Major aircraft manufacturers have rushed representatives to Washington to push their own interests. Included are Mitsubishi Heavy Industry Reorganized and Kawasaki Aircraft Co. Also, represented is Komatsu Trading Co. which wants to sew up certain metallurgical contracts which are prerequisite to any manufacturing in Japan.

Toho Titanium Co., a Mitsui enterprise, has executives here seeking some of the money either through long term orders for titanium metal or in short term capital for expansion of production capacity. They are dangling attractive cost estimates before U. S. officials: about one dollar per pound.

Japanese officials also are hoping for some U. S. offshore procurement to provide dollar income with which to pay for technical assistance and some of the equipment which they will need.

German Market

Latest focal point for U. S.-British competition for aircraft business is the resurgent German market. German aviation, a powerful prewar and wartime force, eventually will offer powerful technical and manufacturing resources in the current airpower race with Russia. However, German industry needs engineering and manufacturing help to get started again.

The new German air force will require foreign-built fighters and trainers to begin operation. Both U. S. and British manufacturers are maneuvering for links with the new German industry.

Best guess now is that Germany will get F-86 Sabres for initial equipment, although Britain is pushing Hawker Hunters for the role.

Missile Problems

Aircraft industry is growing increasingly uneasy over recent trends in the business pattern for new USAF missile developments. Aircraft Industries Assn. is considering a strong protest to the Pentagon. Big battle on upper Pentagon levels looms now between the established missile contractors and the Johnny-come-latelies in the field.

Aussies on Their Own

Pentagon isn't planning to seek offshore procurement orders to help Australian airpower development (Aviation Week Nov. 1, p. 24). Offshore purchasing still is based primarily, if not exclusively, on economic necessity, rather than upon military-strategic consideration. And there are no indications that Australia needs economic help now.

—Washington staff

AVIATION WEEK VOL. 61, NO. 19
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New Airpower Obligations Top $2 Billion

- **USAF, Navy let firm contracts just prior to elections; unannounced letters of intent add further millions.**
- **Grumman, Douglas, UAC get largest blocks of orders. Sikorsky helicopters orders top $57.3 million.**

More than $2 billion has been poured into the aircraft industry during the last 60 days by the Air Force and Navy. Latest increment of $828 million was announced by the Department of Defense in the final week of October, just prior to the Nov. 2 congressional elections.

This increment included $693,578,176 obligated by the Navy's Bureau of Aeronautics and $135 million by USAF. These contracts were revealed less than 30 days after USAF announced a total of $1.2 billion in new contracts placed with the aircraft industry in September (AVIATION WEEK Oct. 18, p. 14).

Total of funds obligated to the aircraft industry is considerably greater than the $2 billion publicly announced. Both services have obligated additional millions in letters of intent but are now prevented by law from reporting these as obligations. Only firm contracts signed by both parties can now be reported officially as procurement obligations.

▶ **Tiger Order**—Douglas Aircraft Co., United Aircraft Corp. and Grumman Aircraft Engineering Corp. received the largest blocks of contracts in the latest USAF and Navy lists.

Douglas got contracts totaling $256 million for its El Segundo, Long Beach and Tulsa Divisions. UAC recorded $193 million spread among its Pratt & Whitney Aircraft Engine Division ($134 million), Sikorsky Helicopter Division ($57 million) and Hamilton Standard Propeller and Accessories Division ($1.8 million).

Grumman was awarded a total of $164.5 million, with $150 million representing production contracts for its F9F-9 Tiger supersonic fighter. The Tiger contracts were the largest for any single aircraft. Douglas got a total of $147 million in contracts for its basic twin-jet bomber design being built by the Navy as the A3D and USAF as the B-66.

▶ **Big Copter Orders**—Other new planes that received initial production orders included:

- **Douglas A4D-1 Skyhawk**, lightweight attack bomber.
- **Chance Vought F8U-1**, a supersonic, carrier-based day fighter featuring a variable-incidence wing, unusual fuselage design and powered by a P&WA J57 turbojet with afterburner.
- **Lockheed T-33B**, a privately financed advanced development of the T-33A jet trainer. Navy is buying the advanced trainer designated as T2V-1.

Another significant contract was the $48 million awarded Sikorsky for its twin-engine Marine assault helicopter (HR2S). Combined with the recent $64-million Army contract for the same machine (H-37), it gives Sikorsky a backlog for this single item larger than the total backlog of its closest competitor in the helicopter business.

USAF and Navy awards in detail:

Aircraft

▶ **Douglas Aircraft Co.**, $256,843,687 total, including:

- RB-66 twin-jet bomber, $41 million (Tulsa Division).
- B-66 twin-jet bomber, $87 million (Long Beach Division).
- A4D-1 Skyhawk lightweight attack plane, $65,656,592 (El Segundo).
- A3D-2 Skywarrior twin-jet bomber, $44,869,402 (El Segundo).
- AD-6 Skyraider attack bomber, $16,253,622 (El Segundo).
- AD-4 Skyraider spares $435,144 (El Segundo).

▶ **Grumman Aircraft Engineering Corp.**, $164,587,184 total, including:

- F9F-9 Tiger supersonic fighter, $151,569,234.
- UF-1 amphibian rescue plane, $12,298,000.

▶ **Lockheed Aircraft Corp.**, $53,378,061 total, including:

- T2V-1 jet trainer (T-33B), $15,105,149.
- T-33A jet trainer, $7 million.
- P2V-7 composite-powered patrol plane, $31,272,912.

▶ **Chance Vought Aircraft Corp.**, $45 million for F8U-1 supersonic fighter and $1,735,969 for a missile test program.

▶ **McDonnell Aircraft Corp.**, $38,769,696 for development of AH-1 all-weather attack-fighter design.

▶ **North American Aviation, Inc.**, $37,694,905, including:

- FJ-4 new Navy version of the Sabre that made its first flight last week (see p. 7), $17,811,966 (Columbus Division).
- FJ-3 Navy Sabre $19,882,939 (Columbus).

▶ **Glenn L. Martin Co.**, $11,986,320 for P5M-2 patrol plane.

Engines

▶ **Pratt & Whitney Aircraft**, $134,503,-

Spending Forecast

Forecast of how defense spending will run for the aircraft and related industries was given to Aviation Week by W. J. McNeil, Assistant Secretary of Defense and comptroller of the Defense Department. McNeil's forecast:

- Aircraft expenditures will hold steady at about the $8-billion level for the next two years. Bomber expenditures will remain about the same as in fiscal 1954 as fewer but more expensive B-52s replace the B-47. Spending on interceptors will increase, but transports will get less money.
- Guided missile expenditures will increase from $300 million in fiscal 1954 to more than $500 million in fiscal 1955 and continue to rise in fiscal 1956-57.
- Avionics expenditures will continue to rise gradually during the next three years with heaviest emphasis on early-warning radar, airborne electronic equipment for all-weather fighters and electronic countermeasures.
- Plant facility expenditures will continue to decrease from the $1-billion level of fiscal 1953-54. About $600 million will be spent in fiscal 1955, decreasing to about $400 million or $500 million in fiscal 1956. Only new facilities required will be for production of new aircraft types and expansion of avionics production capacity.

Defense Department expects to continue its annual contracting rate at about $13 billion for the next two fiscal years.

069 for J57 turbojets and R2800 piston engines.

Missiles

▶ **Sperry Gyroscope Co.**, $123,092 for missile development.
▶ **Raytheon, Inc.**, $2,743,045 for Sparrow missile.

Electronics

▶ **Radio Corp. of America**, $833,680 for engineers services.
▶ **Sylvania Corp.**, $1,685,638 for electronic equipment.
▶ **Sperry Gyroscope**, $1,857,776 for gyro compass equipment.
▶ **Bell Aircraft Corp.**, $169,912 for audio frequency coders.
▶ **Radioplane Co.**, $172,578 for target drones modification.
▶ **Magnavox**, $113,685 for electronic research and development.
▶ **Texas Instrument Co.**, $237,859 for electronic indicators.
▶ **Aircraft Radio Corp.**, $2,419,447 for electronic components.
▶ **Philco Corp.**, $981,050 for personal engineering services.
▶ **International Telephone & Telegraph Corp.**, $4,747,652 for electronic equipment.
▶ **Western Electronic Co.**, $1,350,000 for sonar research.
▶ **Central Commercial Industries Co.**, $341,210 for electronic components.

Helicopters

▶ **Sikorsky Aircraft**, $57,313,912 including:
• H2S-1 twin-engine Marine assault helicopter, $48,202,514.
• HSS-1 ASW helicopter, $8,615,986.
• HO4S spares, $495,412.
▶ **Hiller Helicopters, Inc.**, $522,630 for YH-32 copters.

Accessories

▶ **Hamilton Standard**, $1,814,988, including $1 million for its new aircraft gas turbine starter.
▶ **Garrett Corp.**, $1,124,246 for components.
▶ **Wallace Aviation Corp.**, $266,771 for research and development on gas turbine compressor and turbine blades.
▶ **McKiernan-Terry Corp.**, $784,679 for catapults.
▶ **Jackson & Church Co.**, $1,077,683 for catapults.
▶ **Eclipse-Pioneer Division** of Bendix Aviation Corp., $1,635,182 for aircraft instruments.
▶ **Holley Carburetor Corp.**, $341,075 for plant facility expansion.
▶ **Corvey Engineering Corp.**, $128,386 for research and development.

Other USAF contracts previously announced, but not detailed in dollar volume are:

▶ **Boeing Airplane Co.**, $25 million for first increment of KC-135 jet tanker production.

Lockheed Aircraft Corp., $11 million first increment of F-104 production.

▶ **Beech Aircraft Co.**, $4,301,492 for 200 T-34 Mentor trainers.

Mach 2 Liner

- **Lockheed designs new supersonic jet transport.**
- **Aircraft would use 'wing tricks,' look like fighter.**

Burbank, Calif.—Lockheed Aircraft Corp.'s first commercial jet transport may cruise at Mach 2, vice president-engineering Hall L. Hibbard told AVIATION WEEK in an exclusive interview.

Hibbard said the company has a design for such a supersonic turbojet-powered transport with range to make runs between Chicago and Los Angeles. Seat-mile costs are estimated at about twice the contemporary level.

The Lockheed executive also predicted a large customer demand for what he called a "nice, new, shiny Viscount"—a modern turboprop transport with a 60-passenger capacity—as the result of Capital Airlines' purchase of Vickers Viscounts from England (AVIATION WEEK Aug. 23, p. 55).

▶ **Planned for Speed**—The supersonic transport would look like a fighter, Hibbard reported. It would use boundary-layer control for drag reduction and some "wing tricks," he said, because "you've got to do away with the wings." (This implies flying partially on fuselage lift, with the possible complication of retractable surfaces of some type for additional lift during the landing and takeoff.)

Company plans for subsonic jet transports depend on the upcoming decision in the USAF tanker competition, Hibbard said. Lockheed sent its design for the competition at the end of August; ready for shipment, the material weighed in at 1,185 lb.

The company believes the size of the prospective tanker order justifies splitting it between two firms for two airplanes, and Lockheed is confident that its design will be one of the two.

▶ **'Cheaper Than Piston'**—"The basic tanker design, with a little work, makes a dandy transport," said Hibbard. "We were lucky that the tanker requirements worked into an airplane that we could turn into a transport. . . .

"A commercial jet transport built around that design would be cheaper to operate than a piston-engined airplane, on a cost-per-seat-mile basis. It would be a big airplane, bigger than the Boeing 707.

"But we have to face reality," Hibbard added. "We're in a tough business, and one of our jobs is to look at all the alternatives. If we were to lose the tanker competition—and, of course, I don't think we will—then the next step would probably be a supersonic jet transport. We've got to make that kind of a jump technically to keep ahead of the field."

▶ **Updated Viscount**—Out of all the current airline and industry thinking about equipment replacement, Hibbard sees a customer demand for an updated Viscount. "The airlines have been talking around this kind of an airplane for two years," he said, "and the Capital purchase has brought it up stronger than ever."

Hibbard pointed out there is no U. S. turboprop small enough to fit in as the powerplant for a four-engine 60-passenger transport, and there is not likely to be because of the lack of military interest in such an engine.

But he believes there is a market of about 500 planes—and this may be a conservative number, he noted. This would mean the sale of 2,000 engines and 1,000 spares.

"That kind of a market might stir up some interest on the part of an engine manufacturer," Hibbard commented. —DAA

Avionics Show Draws Big Crowd of 7,000

Los Angeles—More than 200 vendors displayed equipment at the Aircraft Electrical Society's 11th annual meeting here last week.

A crowd of 7,000 gathered to see the latest in avionic equipment exhibited by large manufacturers such as Westinghouse Electric Corp., General Electric Co., and Minneapolis-Honeywell Regulator Co. and smaller firms.

AES president Charles S. Milliken said he believed it was "by far the largest and best show the society has sponsored."

Britain Rejuggles Cabinet Air Posts

Control of British aviation has changed hands in a rejuggling of top cabinet posts, moving Harold Macmillan up to Defense Minister and Selwyn Lloyd to Minister of Supply.

Macmillan, onetime Secretary for Air, succeeds Field Marshal Earl Alexander, who resigned. Lloyd, former Minister of State at the Foreign Office, takes over from Duncan Sandys.

Two New Bells

- **Three- and four-placers are put on the market.**
- **New survey shows need for improved models.**

Ft. Worth—Bell Aircraft Corp. is not quoting definite prices, but it is promoting commercial sale of two new helicopters and says they will be ready for market early next year.

Newest addition to the Bell line is the 47H, a streamlined version of the company's widely used Model 47 utility helicopter. Prospective customers have not been shown a price tag, but an educated guess for the three-place aircraft puts it in the $42,500 range.

Bell also is demonstrating a four-place helicopter, the 47G-1 (AVIATION WEEK Sept. 13, p. 17). Again, no price has been set, but speculation places the price at about $47,500.

▶ **Satisfaction, Safety**—With more than 1,000 of the parent aircraft already produced, Bell says use of identical dynamic components in the 47H insures satisfaction, safety and low maintenance costs. Time between major overhauls will be 600 hr.

Useful load for the 47H is given as 870 lb. It carries 35 gallons of fuel, has a range of more than 200 mi. at a speed of about 90 mph. An improved 200-hp. Franklin engine will be installed in production models.

▶ **Serious Effort**—In a recent market survey conducted by Bell on a tour with the Model 47G, basic utility design, sales personnel uncovered wide interest in the aircraft but found it handicapped by low speed, ungainly appearance and lack of real passenger comfort.

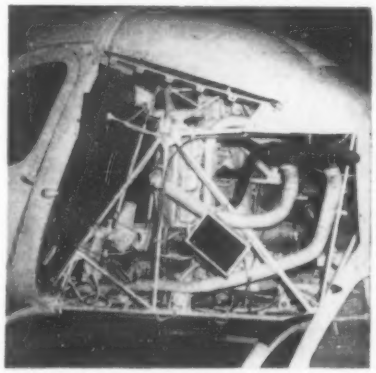
The 47H is Bell's first serious effort to overcome these objections. The fuselage has been closed in with metal and painted white. A baggage compartment has been installed, along with a plush seat. Cabin has been enlarged to permit wider seats and insulation added to reduce the noise level. Further improvements found in the 47H include use of Fibreglas construction for some cabin and door assemblies, providing greater strength and rigidity than sheet metal and requiring less maintenance.

Streamlining of the fuselage has increased speed about 20%, according to Joe Mashman, pilot and assistant director of contracts. He says placing controls and switches on a console at the pilot's left adds to safety and ease of operation.

▶ **Executive Copter**—The company says it has designed the machine primarily for the executive transport and passenger market, although it also can be equipped for utility purposes and work over water.

It was given its first public showing last week in Dallas at the annual meeting of the National Business Aircraft Assn. (see p. 16).

STREAMLINING of basic Bell 47G gives new 47H (above) about 20% higher speed and proportionate reduction in fuel consumption. Now undergoing CAA certification trials, the copter's general configuration is similar to the 47G (Aviation Week Sept. 13, p. 17).



ENGINE is improved 200-hp. Franklin. Removable panels aid maintenance. Flight time between overhaul is 600 hr.

BAGGAGE AREA is large enough to allow passengers to take ample luggage. Here are 200-lb. man and a three-suiter.

INSTRUMENT CONSOLE is located at pilot's left to give him and passengers more room in the 47H's enlarged 60-in. wide, side-by-side cabin. Seats are automobile size.

OVER $5 MILLION in business aircraft crowd ramp at Love Field at Dallas, in biggest turnout ever seen at NBAA convention.

Business Flying Convention Report

NBAA Sees $5-Million Aircraft Display

By Claude Witze

Dallas—The National Business Aircraft Assn. wound up its seventh annual meeting here last weekend with the largest display of corporate aircraft ever assembled in the United States.

With more than $5 million in plush aircraft on exhibit—ranging from helicopters and lightplanes to flying club rooms in the $300,000 to $800,000 price bracket—the meeting marked the definite maturity of NBAA and the aircraft industry's recognition of the substantial business plane market.

Cole Morrow was replaced as chairman of the NBAA board by Henry W. Boggess of the Sinclair Refining Co., Tulsa, Okla., during a closed meeting. Gerald J. Eger of International Harvester Co., Chicago, was elected treasurer, and Ralph E. Piper, Monsanto Chemical Co., St. Louis, was named vice chairman.

Jean H. DuBuque, the association's executive director, reported 435 registered delegates attended the Dallas meeting. This compared with 237 at the 1953 session in St. Louis. NBAA now has 278 corporate members.

► **Question Experts**—Four panel sessions were held during the three-day meeting, at which NBAA members, pilots and experts from industry and Civil Aeronautics Administration held informal discussions on air safety, traffic control, navigation and business aircraft operations.

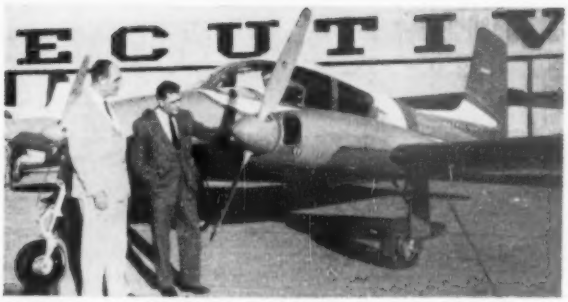
The sessions gave business pilots a chance to exchange information and to query government experts on the operation and future programming of airway improvements.

Highlights of the discussions included:

- NBAA has assurance that pilots and co-pilots working on straight salary do not come under provisions of the wage and hour law as long as they have a commercial instrument rating.
- Representatives of CAA urged NBAA members to file aircraft malfunction reports voluntarily and to exchange them within the organization. It was pointed out that the reports are required at present only from certificated airlines.
- NBAA currently is studying loss of license insurance for corporate pilots. Members will be advised where they can get such insurance and the cost of protection.
- The association plans to set up a pilot proficiency training program with CAA's assistance. Pilot members were urged

$65,000: Royal Gull five-placer is an Italian import that will be assembled in U. S.

$195,000: DH Heron is new four-engine British entry in U. S. business market, seats 8-17.



$50,000: Cessna 310 typifies new light twin-engine planes.

$69,950: Beech Twin-Bonanza C50 seats six, cruises at 200 mph.

$300,000: Learstar is updated version of popular Lockheed 18.

$35,075: Piper Apache carries four at 170-mph. cruise speed.

$36,500: Riley '55 is Navion conversion by Temco Aircraft Corp.

$69,500: Aero Commander is popular 5-7 place business plane.

to practice instrument flying on deadhead trips.

• CAA spokesmen urged business aircraft operators to buy and use VOR-DME equipment and not delay for possible introduction of Tacan (AVIATION WEEK Oct. 25, p. 82). They said existing equipment will be good for its life even if the military-sponsored Tacan system does come into full use.

• VOR coverage is solid over nearly all of the U.S. A survey shows only four minor gaps at 20,000 ft.

• Aviation Department of Sears, Roebuck & Co. operates under a charge system and submits a profit-and-loss statement. Their DC-3 is "paid for" on the basis of eight airline passenger fares plus tax. Average load is 10 passengers. Operation does not show "profit" on this basis but comes within 25% of breaking even, except in years when there are substantial expenses for new equipment.

• There was a minimum of talk about new designs for corporate aircraft. A substantial number of delegates believe the DC-3, modernized and equipped with R2000 engines, will continue to hold an important spot in the business aircraft field.

On display at Love Field were three converted DC-3s, including the Hi-Per version put up by Panagra with R2000 engines (AVIATION WEEK Nov. 1, p. 70). A second DC-3 with the same power unit was shown by Executive Aircraft Interiors. Grand Central Aircraft showed its Skyrama DC-3 with 1830-94-M1 engines. Both of the latter are priced at $275,000.

▶ **K&T's Gull**—Newest business plane on display probably was the Royal Gull amphibian, now offered at $65,000 by Royal Aircraft Corp., Milwaukee. Royal is a subsidiary of Kearney & Trecker Corp. that plans to import the basic aircraft from Piaggio & Co., of Italy.

The Royal Gull will carry five persons. Cruising speed is given as 172 mph., and range is 1,250 mi. with a fuel capacity of 205 gal.

Francis J. Trecker, K&T president, told AVIATION WEEK he has shipped two 270-hp. Lycoming engines and a set of Hartzell three-blade, variable-pitch, constant-speed propellers to Italy for evaluation and certification. With approval, he will import Royal Gulls for assembly in Milwaukee with American components. The aircraft has been in service with the Italian air force three years.

Trecker said he has received more than 700 inquiries since announcing his program. Operators of offshore oil wells particularly are interested in the Royal Gull for shuttle service of personnel and supplies to rigs in the Gulf area.

▶ **Helicopters Ready**—Major interest was shown in Bell Aircraft Corp.'s helicopters, 47H and 47G-1. No prices were quoted to NBAA visitors, although Bell spokesmen said the aircraft will be ready for delivery early in 1955.

De Havilland Aircraft Co.'s four-engine Heron, priced at $195,000, was another plane attracting wide interest. Available in eight- to 17-seat configurations, it is powered by DH Gipsy Queen 30 Mk. 2 engines and has small de Havilland two-blade, non-feathering propellers. Cruising speed is given as 185 mph., with range of 1,800 mi.

Other important multi-engine business planes on exhibit were the Martin

2-0-2, Grumman Super Widgeon amphibian, Beechcraft C50 Twin-Bonanza and Super 18, the Aero Commander 560, Piper Apache, Riley Twin-Navion and Lear Learstar.

▶**Airline Cooperation**—Featured speakers at the convention were Robert Ramspeck, vice president of Eastern Air Lines, and Seaborn P. Collins, national commander of the American Legion.

Ramspeck, who spoke at NBAA's annual awards luncheon, urged the organization to join hands with the nation's airlines in the solution of mutual problems and in action to protect airway users from restrictive laws.

The former congressman and executive vice president of Air Transport Assn. told the delegates that their use of aircraft for business purposes largely is responsible for the current trend toward decentralization of American industry. This movement, he said, is good for the country's economy, while their flying improves our reserve of planes, pilots and mechanics in case of war and provides more stability for the aircraft industry.

▶**Demands National Policy**—NBAA figures show that 21,500 aircraft are operated by business firms and that nearly 2,500 of these are multi-engine planes. This is substantially more than the 1,300 operated by the airlines, although the carriers naturally fly a greater number of passenger miles.

Collins, addressing the association's annual banquet and honors night, called on NBAA to support the American Legion's demand for a definite national air policy "as the only practical method of giving meaning to longrange military planning."

▶**Top Honor**—NBAA's highest honor, the 1954 Special Award, was given to Donald M. Stuart, director of CAA's Technical Development and Evaluation Center at Indianapolis.

A bronze plaque, citing Stuart for his part in the development of air navigation aids, lighting, airports, aeronautical charts, radio and electronic equipment and air traffic control devices, was presented by Cole H. Morrow, retiring board chairman.

Re-elected directors: William B. Belden, Republic Steel Corp., Cleveland; Joseph B. Burns, Fuller Brush Co., Hartford, Conn.; Walter C. Pague, Armco Steel Corp., Middletown, Ohio, and Delos W. Rentzel, Auto Transports, Inc., Oklahoma City.

RAE Proposes New Tests at Comet Inquiry

London—Sir Arnold Hall, director of Royal Aircraft Establishment, last week told the Comet court of inquiry what new pre-acceptance testing he believes should be done on British-built aircraft:

• Identify the most likely fatigue-prone parts by, among other methods, doing RAE tank tests on an entire aircraft.

• Test to destruction by duplicating loads on six each of production specimens most likely to fail, then take the average life and divide this figure by three.

Result is maximum safe life. After one test to destruction, repair the part to guarantee it will not fail at the same location under further testing, then test it to destruction again to get the No. 2 failure point.

RAE experimental evidence is that half a dozen specimens are all that are needed to test for almost conclusive results.

This procedure would permit design changes to be made and/or parts replacement schedule for operational aircraft determined ahead of time.

▶**Maximum Stress**—The fact that windows in the Comet 1 are square is not condemning in itself, Sir Arnold told the inquiry.

RAE investigations have shown that maximum stress on a round hole in a flat metal sheet is little different than the maximum stress on a square hole with rounded corners, like those of the Comet 1.

The point not gone into, however, was the differences in structure needed properly to distribute the load away from cutouts in complex structures such as an aircraft fuselage. Stress comes from the structure, not the window shape. There was no testimony given in detail on this, but Sir Arnold indicated it was an important factor.

▶**Manufacturing Cracks**—De Havilland Aircraft Co. is concerned at the publicity being given to manufacturing cracks.

Sir Arnold said that if he had known about them after the Elba crash last Jan. 10, he would not have recommended that the Comet re-enter service prior to the Naples accident in April unless the cracked parts had been replaced.

On G-ALYP (the Elba Comet, approximately 70% of which was recovered from the sea), there were four of these cracks around the rear ADF window, three in the reinforcing plate and one on the skin under the plate. Some rivets around this window also were 0.24 in. from the edge of the plate instead of 0.3 in., as apparently called for in design drawings. This is outside normally accepted permissible tolerance.

There has been no indication, however, that this or cracks per se contributed to the Elba breakup.

Other witnesses before the court last week were representatives of the Air Registration Board and de Havilland.

Explosion Suppressor Protects U.S. Planes

A British-conceived device for snuffing out aircraft explosions in the milliseconds between ignition of fuel/air mixtures and actual blowup is being installed on production models of one Air Force and two Navy planes.

The explosion suppression system, originally developed by Britain's Royal Aircraft Establishment and now manufactured in the U.S. by Simmonds Aerocessories, Inc., at Tarrytown, N. Y., scatters a combustion inhibiting fluid throughout aircraft fuel tanks immediately after ignition. (AVIATION WEEK June 11, 1951, p. 45).

Simmonds identifies the three planes that now use the device only as "advanced combat types."

▶**Crash Fire Tests**—The new system is being used in experimental work to fight fires in engine nacelles, primarily guided missile powerplants. And some tests are under way to combat crash fires with explosion suppression.

These two possible applications of the concept first were proposed by RAE's W. G. Glendinning and A. M. MacLennan, who carried out original work on the system in 1949.

Glendinning says the rate of travel of the carbon-tetrachloride combustion inhibitor from its detonator is approximately 300/ft./sec., faster than the speed of burning hydrocarbons.

"We think this high rate of scatter may make it feasible to utilize the system of dispersal to combat crash fires by blanketing engine exhaust systems and for flooding compartments into which fuel may leak from damaged pipes or tanks," he says, "and to combat fires in engine nacelles in which a high rate of air flow makes it impossible to maintain a sufficiently high concentration of extinguishant with the usual pressurized bottle and spray system."

▶**'Wet Blanket'**—Described as a "wet blanket for aerial blowups," the explosion suppression system includes these basic elements:

• **Sensing element** designed to detect a budding explosion before its reaches destructive proportions.

• **Suppressant fluid capsules** that detonate when a circuit from the detector closes, scattering a mist that blankets the explosion.

Simmonds says each system is designed to meet the requirements of individual aircraft and can be installed as protection against single or multiple explosions. The system uses two types of detectors, visual or pressure-rate-of-rise.

Granted a U.S. patent last week, Simmonds holds sole manufacturing rights in America under a license from the Graviner Manufacturing Co., Ltd., of England.

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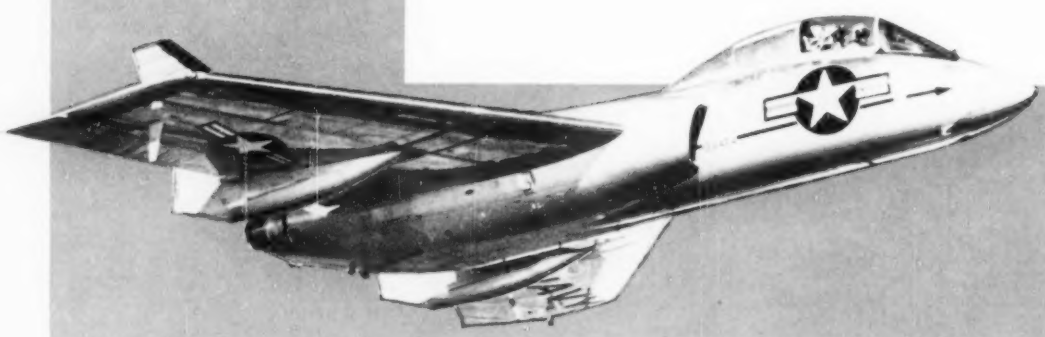

SIX component parts of the F7U-3 Cutlass have been awarded to the Omohundro Plastics Company for production. Omohundro offers to airframe manufacturers these "Four E's"—

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How AMC Terminates Contracts

Cutoff process speeded by using new procedures that make possible salvaging of much surplus materiel.

By Claude Witze

Dayton—Contract terminations now are sliding through Air Materiel Command machinery with fewer delays than at any time since the end of World War II.

In addition, AMC is salvaging a record amount of the serviceable property and material left on hand in contractors' plants where terminations have been ordered.

▶ **30% Sold**—According to Col. William H. Harrell, chief of the Readjustment Division of the Directorate of Procurement and Production, the Air Force economy drive for the past 12 months has seen 70% of the inventory at plants of terminated contractors salvaged for government use. Only about 30% is being sold at the present time as surplus.

"The contractor now is getting better service and USAF is saving more money than any time in the past," Col. Harrell told AVIATION WEEK. "I believe we are past the peak of our load in contract terminations, but this office also has become more efficient with experience and the consolidation of rules, regulations and procedures into workable form.

"As for economy, the amount of declared surplus sold by AMC probably is lower today than it has been in the past 10 years."

▶ **Excess to Needs**—Most contract terminations before completion of delivery are made "for the convenience of the government," Col. Harrell said.

This convenience is not a matter of whimsy, he adds, pointing out a USAF directive that a halt in production is necessary "when the supplies or services being procured have become excess to requirements."

Conditions leading to this situation include:

- A better item has been developed through research.
- Requirements have changed due to different world conditions.
- Combat experience dictates a change in equipment types or quantities.
- Congressional appropriations force a change in program.
- An adequate and safe stock level has been reached.

Col. Harrell put additional emphasis on the economy factor: The purpose of any termination in the long run is to stop spending money.

He said this is the reason AMC contracts include a provision giving the directorate the right to terminate a contract. Material, manpower and facilities cannot be wasted.

▶ **Headquarters Decision**—In the case of aircraft, the decision to terminate a contract is made by Headquarters, USAF. The effect is felt quickly by the suppliers of all the equipment that goes into the weapons system, both government-furnished and contractor-furnished. Most of these items also are terminated at once.

In the case of supplies other than aircraft, the office that originated the procurement request makes the termination decision. Col. Harrell cited engines as an example. If the Supply Division originated the procurement request, it also would request termination and initial action is taken by the Procurement Division buyer who issues a "termination authority."

This document is passed to Col. Harrell, giving the reason for the cutoff—whether it is partial or complete and the effective date. The Readjustment Division acts under terms of the contract, which provides for settlement by negotiation or by specific terms that have been included as part of the original agreement.

First decision made by Col. Harrell's office is whether the contract is to be terminated for the convenience of the government or for default of the contractor. To speed action, the contractor is notified of the decision by telegram, followed by a letter to verify the items and quantities that are being cut off.

Under the decentralized purchasing program started two years ago, offices outside of AMC headquarters at Dayton have delegated authority to issue termination notices. Termination is handled by the decentralized office if the cutoff can be accomplished without cost. Otherwise, it is assigned by Col. Harrell to a termination contracting officer.

▶ **Prompt Action**—Most important for the prime contractor is his responsibility to notify subcontractors at once that their product no longer is needed.

"We recognize," Col. Harrell said, "that nobody can press a button and stop work on a moment's notice, but the government does expect contractors and subcontractors to act quickly and halt production as quickly as possible."

Settlement of a terminated contract is handled by this team:

- **Termination contracting officer,** responsible for negotiating settlement and all final decisions for the government.
- **Plant clearance officer,** assists and advises on property matters, instructs contractor in preparation of termination inventory schedules and how to use or dispose of property.
- **Auditor,** assists and advises on costs, drafts written report on contractor's settlement proposal.
- **Legal officer.**

Col. Harrell says a contractor who has received a termination notice should not delay seeking a conference with the proper AMC representative. This is essential to provide for interim financing and the handling of claims and inventories that will come from subcontractors.

For this conference, the contractor can appoint his own agents who are empowered to act for him; reasonable costs for this purpose will be allowable. This is confined to preparation of the settlement proposal, handling inventories and settling subcontractor claims. It does not cover contractor expense in negotiation of termination.

▶ **Approval Waiver**—Terminated subcontracts must be terminated by the contractor—or subcontractors—who made them, subject to approval of the contract termination officer. In some cases this approval may be waived if the amount of the contract does not exceed $10,000.

"It is not at all unusual in a normal termination case for the prime contractor to have several hundred subcon-

Edged in Black

There is a form telegram used by Air Materiel Command that causes a lot of scurrying when it arrives in the office of an Air Force contractor.

"You are hereby notified," the wire says, "that your contract is terminated in its entirety for the convenience of the government, effective immediately."

The blunt truth is that any contractor, whether he makes fighter planes or lead pencils, could receive such a message from Wright-Patterson AFB. It is equally true that a large number of contractors would be not only shocked, but baffled, by the telegram. They need to know:

- **Why was the order canceled?**
- **How they will get paid for the work and inventory on hand?**
- **How and where do they present a claim for settlement?**

Aviation Week, in its Aug. 16 special issue on Air Materiel Command, provided industry with a one-volume handbook on how the Air Force buys weapons systems and all the supporting equipment—a purchasing program that makes it the biggest business in the world.

The accompanying article explains how and why AMC terminates contracts.

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Settling Contracts

Settlement of a terminated AMC contract is governed by provisions of the contract.

For methods, procedures and policies to be followed, contractors are referred to Section 8 of the Armed Forces Procurement Regulation and Air Force Manual 70-6 (Air Force Procurement Procedures). These documents give:

- Forms for preparing and submitting a termination claim.
- Supporting documents required, such as inventory schedules and accounting information.
- Cost principles for evaluating items in the termination claim.
- Directions for using or disposing of inventory.

As guides in the settlement of a terminated fixed-price contract, the government uses the cost principles set forth in Part 4 of ASPR Section 8.

In the event of a formula settlement, utilization of such principles are mandatory. In the case of a cost-plus-fixed-fee, cost reimbursement or construction contract, the applicable cost provisions of ASPR Section 15 that have been incorporated in the contract are applied.

tractors in several tiers," Col. Harrell says. "The use of the permissive delegation of authority up to $10,000 permits more expeditious handling of the subcontractor settlements by dispensing with the necessity of government approval. . . .

"We are intensely aware of the fact that the subcontractor structure constitutes in most instances an integral and important part of the procurement of the end item. Unless the terminated subcontractors are settled fairly and expeditiously, the financial stability of the subcontractors could be seriously affected.

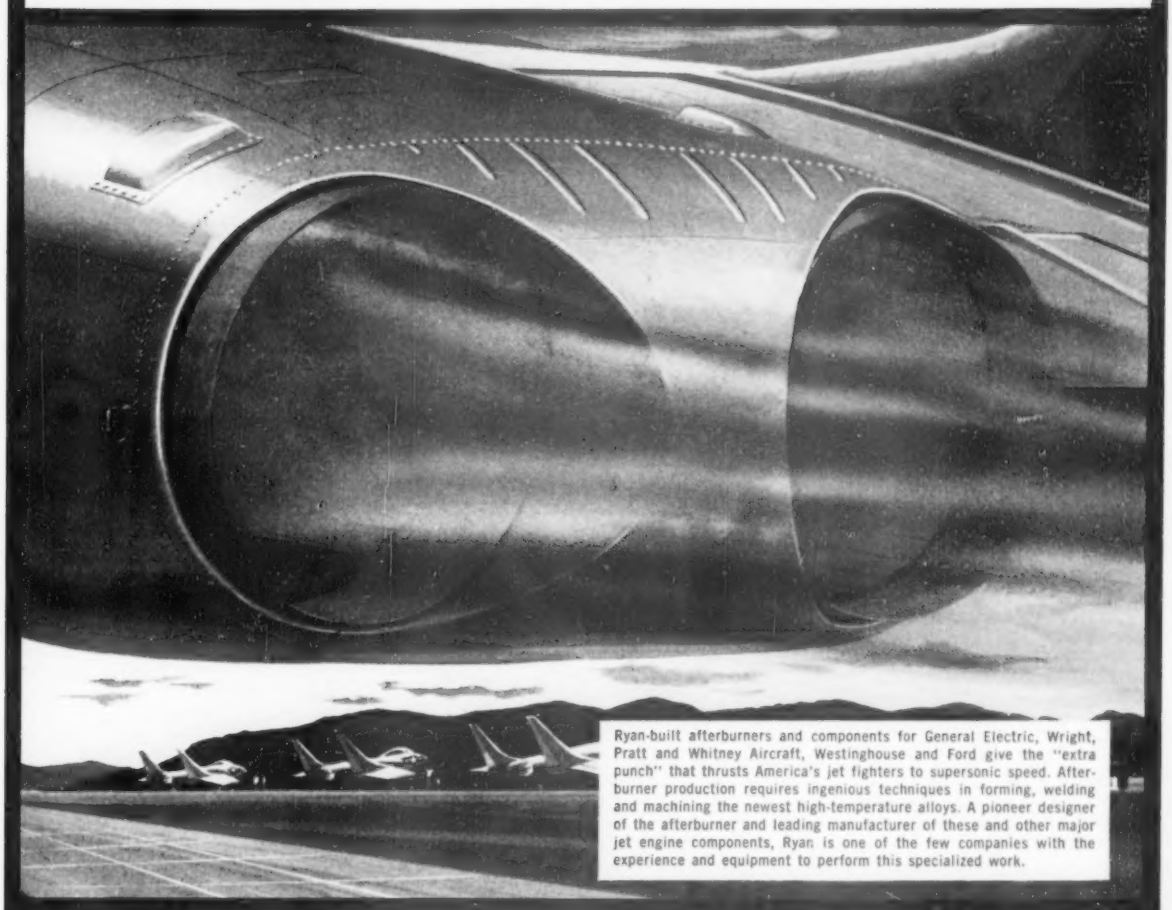
"Failure to handle such matters properly could upset the economy of the community where a plant is located. The Air Force makes it part of our business to see to it that such claims are properly settled."

▶ **Procedure Aids**—While AMC retains the right to disapprove a terminated subcontractor's claim, there are regulations to expedite the procedure:

- The subcontractor's settlement must be audited in the same way as the prime contractor's claim.
- The accounting review must be done by the prime contractor or the next higher tier subcontractor.
- Where the amount exceeds $25,000, the accounting is examined by Air Force auditors.
- If necessary, AMC can order a further accounting review.

When it comes to actual negotia-

RYAN AFTERBURNERS BLAST U.S. JETS AHEAD



Ryan-built afterburners and components for General Electric, Wright, Pratt and Whitney Aircraft, Westinghouse and Ford give the "extra punch" that thrusts America's jet fighters to supersonic speed. Afterburner production requires ingenious techniques in forming, welding and machining the newest high-temperature alloys. A pioneer designer of the afterburner and leading manufacturer of these and other major jet engine components, Ryan is one of the few companies with the experience and equipment to perform this specialized work.

Another Example of How

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And in other fields, too – aircraft design, airborne electronics, drone missiles, basic research and development – Ryan has demonstrated the know-how which comes only from a background of 32 years in building planes and aeronautical products. Ryan's deserved reputation is built on producing only the best, delivering on time, and at minimum cost.

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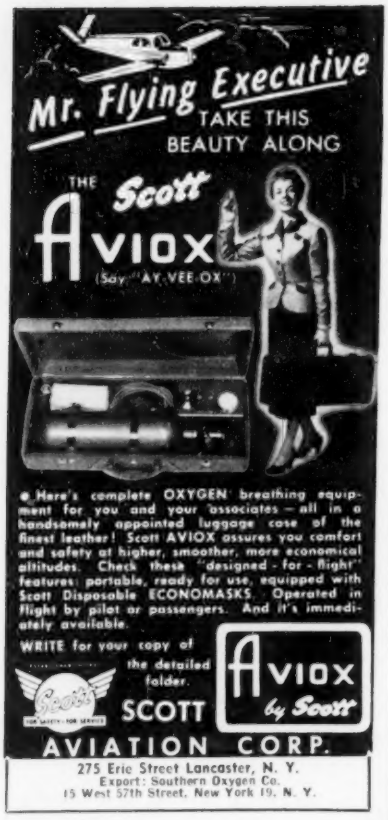
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Says *Leonard Lee*

Chief of Maintenance—Continental Can Co., Inc.

"Those modifications make my engine safer, more reliable and less costly to operate. For instance, 98 different modifications must be applied during overhaul to modernize the R-1830. If any of these are skipped, my engine isn't as up-to-date as it should be. And most modifications are inside—where I can't check them!

"That's why I stick to Airwork for overhauls. They are *completely* dependable."

Mr. Lee has supervised maintenance of Continental Can Company's business fleet for 9 years. Last year they flew 3,000 hours — more than 657,000 miles. Mr. Lee was formerly in charge of Convair's Flight Engineer School.

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tions, usually there is a series of conferences pending completion of the prime contractor's audit and disposition of the property involved. If no agreement is reached, the termination contracting officer renders a finding and the contractor has 30 days to make an appeal to the Armed Services Board of Contract Appeals.

▶ **Industry Assistance**—"We try to settle termination cases by negotiation whenever possible," Col. Harrell said.

"The same basic business philosophies that existed under the joint termination regulation have been incorporated in Section 8 of the Armed Forces Procurement Regulation and Air Force procurement procedures. Industry has been prominent in drafting these provisions and they proved their value during World War II.

"During the war some 27,000 prime contracts and hundreds of thousands of subcontracts were settled along the same lines."

▶ **AMC Screening**—One major headache growing out of contract termination is the disposal of inventory.

The contractor, working with AMC's plant clearance officer, has to sort and classify the material. Where reimbursement is demanded, there must be an inventory schedule.

Wherever possible, items are diverted to other government projects or to the contractor's commercial business. Common material that can be used by the contractor will not be paid for by AMC in the settlement.

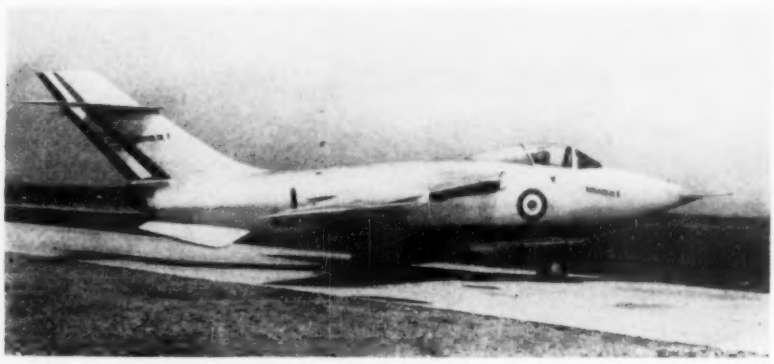
If property cannot be used by the contractor, a list of it is sent to AMC for screening to find out where the Defense Department or other federal agencies might be able to use the items.

▶ **Termination Time**—How long does it take to terminate a contract?

Generally, Col. Harrell said, it can be done within six months. Some take longer and if circumstances warrant, a partial payment may be made on the final settlement.

"The time it takes to settle a termination," the colonel said, "depends in many cases on the promptness with which the contractor submits his settlement proposal and the supporting documents."

He emphasized at this point that a



French Test Latest Version of Baroudeur

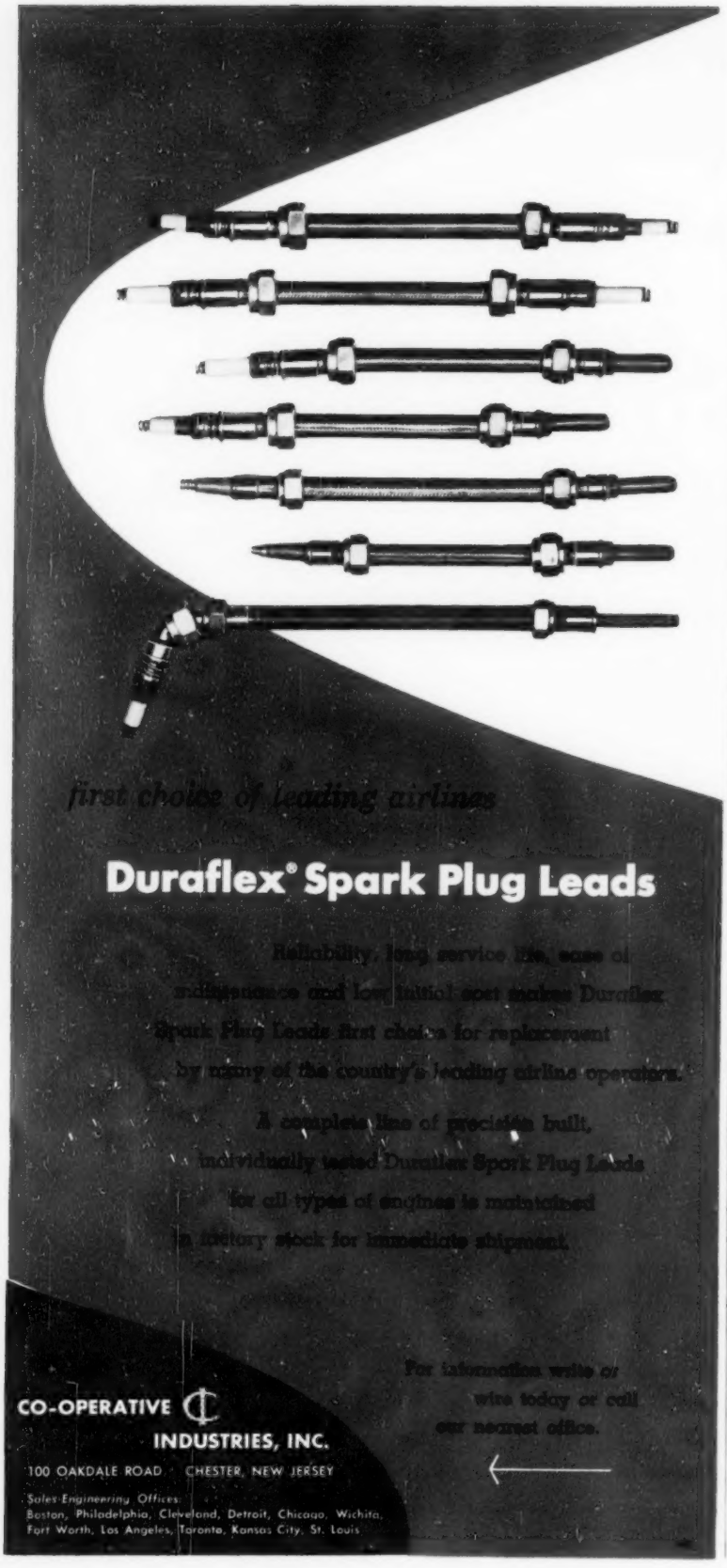
First photos of the second prototype Sncase S.E.5000 Baroudeur lightweight ground-attack jet show the plane on its rocket-powered takeoff dolly (top view) and on its extended belly skids after a landing (lower photo). This plane has more fin area above the horizontal stabilizer than the first prototype, in addition to a streamlined fairing at the junction of rudder and fuselage. The canted, fin-like sections on the lower portion of the aft fuselage also are new, although a flight view of the second S.E.5000 shows it without these surfaces. The Baroudeur is being studied for possible use as a standard ground support plane for the North Atlantic Treaty Organization.

This is a Lear engineer designing a new autopilot

JOHN HARPER, B.S.E. (University of Michigan), is one of *ten* Lear engineers qualified and actively flying as jet pilots. But please note that these ten engineers are engaged *primarily* in the design, development, and perfection of automatic flight control systems, using their jet piloting skills only as an *engineering* tool.

At Lear, first-hand *in-flight* analysis is an integral part of development. As a result of this program, continuously checking theory against performance, Lear is exceptionally equipped to offer the most advanced solutions to the challenging and ever-changing problems of automatic flight stabilization.

LEAR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profit or fee is allowed only on actual work performed and AMC does not make up for a company any profit it has lost because of termination of a contract.

In the substantial brackets, termination settlements must be submitted to a review board in the Air Materiel Area having jurisdiction. If the amount is over $500,000 another study is required by the Settlement Review Board at AMC headquarters.

In the event that the proposal fails to pass one of these tests, it is returned to the termination contracting officer for further negotiations to be held with the contractor.

Not all terminations, of course, are for the convenience of the government. AMC also has "defaults."

When a contractor fails to deliver and cannot justify his failure, AMC still needs the item or the service. In this case there is a penalty. When USAF is forced to find another source costs almost invariably go up. The defaulted contractor then faces an assessment, which can be appealed within 30 days to the Armed Services Board of Contract Appeals.

Defense Needs Small Business, Lewis Says

Small business efficiency, says Assistant Air Force Secretary Roger Lewis, is fundamental to the overall defense program.

He says these firms are essential to the Air Force mission, most necessary in the event of quick mobilization for any emergency and, more important, their dispersal throughout the country is advantageous in event of attacks on the U. S. mainland.

In an effort to erase any idea that a few large prime contractors have a monopoly on USAF contracts, Lewis told some 200 small business representatives in New York recently that there is need for their further integration under present weapons systems contracting policies.

He urges large contractors to intensify subcontracting to small firms.

One reason small business does a good job is that the owner has a low overhead, Lewis says, and adds:

"He doesn't have somebody taking buyers out to be entertained and he doesn't have men on the road all the time. In many cases, he does not know how to sell. He doesn't know where to go. He's generally his own salesman, but he's busy running his plant.

"So it's important that the Air Force, . . . while not doing his selling for him or giving him any special breaks, sees that he gets a break at least as good as the man who has the high-powered sales department."

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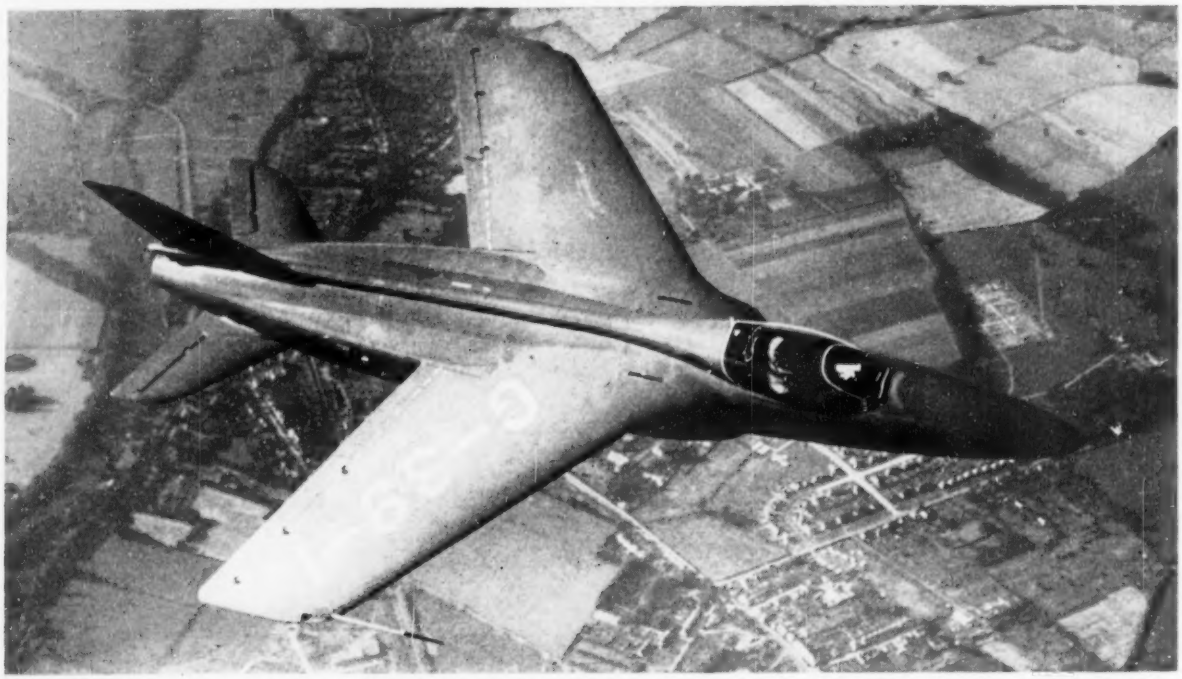


MIDGE is flying with Viper jet in place of higher-thrust Orpheus that will power production Gnats. Dorsal spine houses control cables.

Folland Tailors Gnat to NATO Needs

By Robert Hotz

Hamble, England—Unusual concepts of aircraft design and manufacturing, operational fighter tactics and political philosophy are being combined in the first Gnat lightweight fighter now being built by Folland Aircraft Ltd. These concepts are primarily the product of Folland's managing director and brilliant designer, William E. W. Petter.

They involve:

• **Design.** Combination of the lightweight design philosophy with the conviction that the designer's immediate task is to improve flying qualities of combat aircraft in the transonic range rather than simply aiming at higher speeds.

• **Manufacturing.** Interceptor and fighter-bomber aircraft must be producible swiftly by semi-skilled manpower using general purpose machine tools, both of which are more readily available in NATO member nations than the highly skilled labor and expensive specialized machine tools now required for large, heavy fighters capable of transonic performance. The simple manufacturing techniques are also necessary for large quantity production using limited labor and financial resources and within the time limits imposed by the rate of Russian aviation's technical progress.

• **Fighter tactics.** Use of swarms of lightweight fighters for initial interception of enemy bombers, in contrast to complete reliance on fewer, heavier and more complex all-weather fighters. The Gnat swarms would carry only a bare minimum of airborne radar and get their primary target guidance from ground equipment similar to that given anti-aircraft missiles. The lightweight swarms would be used as the outer defense line. The big, heavy, complex two-man all-weather fighters would form the inner defense to pick off the few bombers that survived the initial swarm attacks.

• **Political philosophy.** Large-scale production of lightweight high-performance interceptors and fighter-bombers offers an answer to both the military and economic challenges of Communism to the NATO countries. The military challenge, demonstrated by the Communists' ability to produce 20,000 MiG-15s, can only be parried by superior performing aircraft that can be produced in greater numbers and in less time. The economic challenge of unemployment and unstable national finances can be met partially by an aircraft production program that provides useful work for skilled and semi-skilled labor in NATO countries without straining their limited financial resouces.

► **To Fly Next Summer**—The first Gnat is scheduled to fly late next summer and make its public debut at the 1955 SBAC Farnborough show. It will be powered by an early version of the Bristol Orpheus axial turbojet produc-

Gnat Performance

Speed	Mach 1.2 level flight
Service ceiling	57,000 ft.
Endurance	3 hr., including 1 hr. at combat altitude
Rate of roll	200 deg. per sec.
Rate of climb	8,000 fpm.

Gnat Specs

Span	20 ft. 8 in.
Length	28 ft. 9 in.
Gross wt	6,000 lb.
Engine	Bristol Orpheus 4,800-lb. thrust
Armament	
(Interceptor)	2x30-mm. Aden cannon 2 air-to-air missiles
(Fighter-bomber)	2x500-lb. bombs Napalm tanks 12x3-in. rockets

ing 3,750 lb. static thrust. This contrasts with the 1,640-lb.-thrust Armstrong-Siddeley Viper now powering the Folland Midge (AVIATION WEEK Sept. 20, p. 13) but is less than the 4,800 lb. thrust planned for the Orpheus production versions.

Key to the Gnat performance will be the Orpheus engine delivering 4,800 lb. thrust for an installed engine weight of about 850 lb.—more than five pounds of thrust for each pound of engine weight. The attractiveness of the Orpheus for airframe designers immersed in the lightweight fighter problem is demonstrated by its choice by eight of the nine competitors in the current NATO campaign (AVIATION WEEK Oct. 25, p. 16) and its specification as an alternate powerplant by the ninth.

The Gnat has been designed from the start around the Bristol lightweight engine. Originally called the Saturn and earmarked to power a Bristol missile, the lightweight engine development program was canceled by the British Ministry of Supply shortly after design of the Gnat began.

▶**Private Financing**—Convinced of Folland's determination to proceed with the Gnat project, Bristol's directors voted to revive their lightweight engine project and finance it privately without any assistance from the Ministry of Supply. Thus the Gnat-Orpheus lightweight fighter project is one of the rare examples, particularly in Britain, of a completely privately financed military aircraft project in which two firms are backing their technical convictions with their own money.

The Orpheus, like the Gnat, incorporates many ingenious design features in which unnecessary structural or equipment requirements have been eliminated to provide more performance. For example, it uses a complete-loss oil lubrication system exchanging the weight of three pints of oil for that of a scavenging system.

The first Orpheus will come out at the 3,750-lb.-thrust rating of the Saturn engine but production models will deliver slightly more than 4,800 lb. thrust and Bristol has developed a simplified lightweight afterburner that weighs only 90 lb. and will add about 40% thrust to the Orpheus output at the Gnat's combat altitudes.

▶**Fighter Engine**—The Orpheus is an axial-flow design with a seven-stage compressor and a single turbine. Its maximum diameter is about 32 in. and the Gnat fuselage was designed to simply wrap around the Orpheus with a maximum diameter of 40 in.

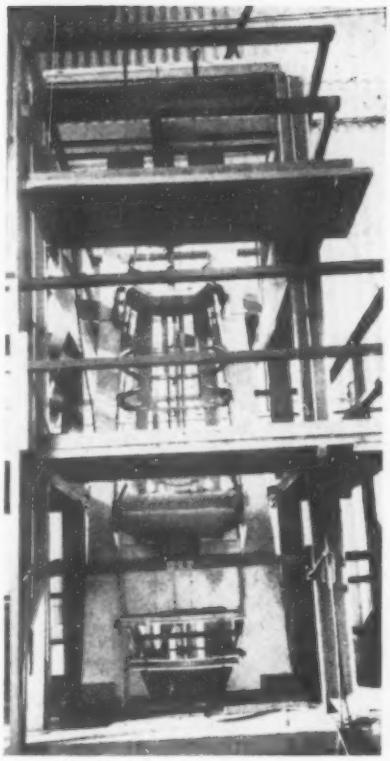
Basic design philosophy behind the Orpheus is that it was designed from the start as a fighter engine and could dispense with many of the requirements that make the bomber-type jet engine so heavy, complex and expensive. It has a relatively low 5-to-1 pressure ratio. This is in contrast to the 11-to-1 ratio of the big split compressor turbojets now powering bombers.

Bristol is aiming at other applications of the Orpheus in addition to the Gnat, including jet trainers, missiles and a "return to base" engine for rocket-powered interceptors.

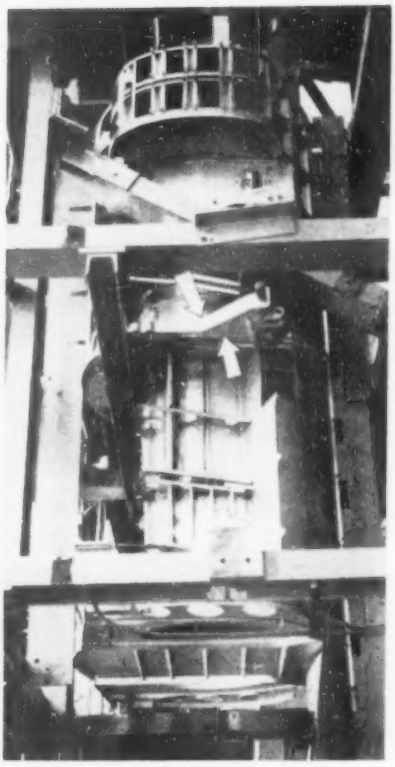
▶**Mach 1.2 Speed**—With the full-powered Orpheus, the Gnat is designed to have a top speed of Mach 1.2 and the capability of making interceptions at 57,000 ft.—an altitude well above the current operating ability of either the Boeing B-52 or the Russian Bison.

Increasing engine power will boost the Gnat's rate of climb to enable it to get to 40,000 ft. in about half of the five minutes that will be required by the prototype. The Gnat will have about three hours endurance with a full hour at combat altitudes carrying interceptor armament.

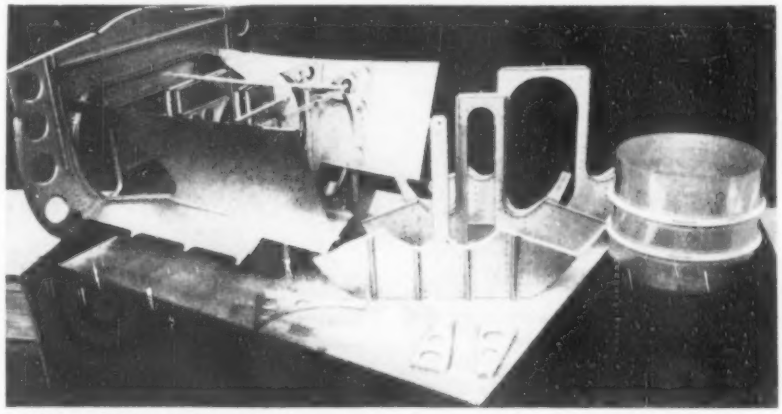
Normally the Gnat will be armed with two 30-mm Aden cannon each capable of firing 1,200 rounds per minute. Provisions also have been made for carrying two air-to-air missiles slung ex-



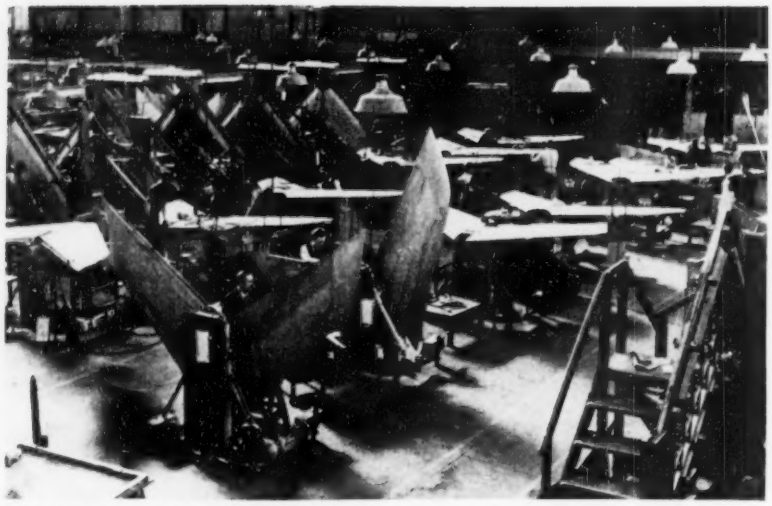
UPRIGHT JIGS for Gnat save floor space, allow simultaneous work at several levels.



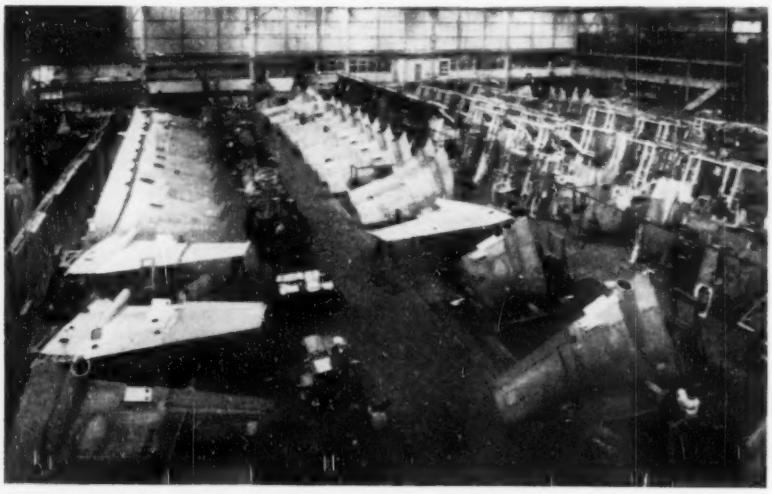
MIDGE shown under construction. There is only one forging (arrows) in entire plane.



TYPICAL GNAT PARTS include aluminum piece stamped out on hydraulic press using rubber-pad technique; bulkheads; air inlets; tailpipes; fuselage internal braces.



FOLLAND BUILDS HUNTER TAILPLANES as a subcontractor to Hawker Aircraft.



VENOM AND SEA VENOM WINGS on the line in Folland's assembly shop at Hamble.

ternally with guidance equipment carried in the fuselage.

Quality Improvement—Petter designed the Gnat primarily as an interceptor but it currently is leading the pack in the NATO fighter-bomber competition (AVIATION WEEK Oct. 25, p. 16). For these duties it could carry a pair of 500-lb. bombs or napalm tanks or 12 three-inch rockets. There is some question as to whether the tire pressure would have to be increased from 100 to 150 psi. to carry the full fighter-bomber load.

Petter believes that despite the initial penetrations by research aircraft into speeds above Mach 2 the fighting aircraft will continue to perform in the transonic range for some years to come. Consequently he believes the designers' big job now is to improve the flying qualities (controllability and maneuverability) of fighter aircraft in this range to make them more effective combat instruments.

With small and lightweight transonic aircraft, Petter believes that military pilots will get back to flying their aircraft instead of having the aircraft fly them—a complaint heard from British test pilots flying experimental prototypes even at high subsonic speeds.

▶ **Fast Production**—The Gnat will have an 8% thickness wing with 40 deg. sweep, two degrees anhedral and an aspect ratio of 3.3. All of these factors combined with power-boosted inboard ailerons and all-flying, low-set tail will make the Gnat highly maneuverable up to its speed limits, Petter believes. In fact, he questions whether the all-flying tail will really be necessary for highspeed control.

Another major factor in Gnat design is its simple and quick production techniques. It is designed specifically for producibility with the type of machine tools and equipment that already exists in European factories.

▶ **Single Forging**—Group Capt. Stewart Tudor, Folland's military liaison man, recently surveyed more than a dozen European aircraft factories for their capabilities in Gnat production and reported that all of them could move swiftly into lightweight fighter production with their existing tools and skill level of their readily available labor force.

There is only one forging in the Gnat and it is a simple 11-lb. job that can be die forged. On it Petter has hung much of the Gnat. The landing gear is attached to it; it takes the rear wing connection and anchors the rear of the Aden cannon. Practically all of the rest of the Gnat's structure can be fabricated with the rubber-pad forming technique on hydraulic presses.

To further conserve factory space and allow faster construction Folland has developed vertical jigs for the Gnat fuselage. As an example of the contrast between Gnat construction and conventional fighters, Folland cites the 950 man-hours required to build the 659-lb. Gnat wing as the same effort required to build a standard RAF fighter's horizontal tail. Since Folland builds them both it should know.

▶ **Simple Tooling**—Production planning for the Gnat has been done with a goal of reaching an output of 50 Gnats a month at Folland's complex of plants in the Southampton area within two years after an order is placed. One big time-saving would be the lack of complex production tools and tooling up required. Folland now employs about 1,600 production workers operating in 500,000 sq. ft. of manufacturing area and has an excellent reputation as a major subcontractor to de Havilland, Bristol, and Hawker.

It now is building Hunter tails, Bristol Britannia nacelles, folding wings (which it also engineered) for the carrier-based Sea Venom, rocket booster casings for guided missiles and other missile components.

The learning curve on Gnat production is plotted from 10,500 man-hours for an initial quantity of 30 to 6,500 man-hours on 500 aircraft where it would level off.

▶ **Comparison**—With its small, lightweight airframe and careful engineering for simple production the economics of the Gnat become interesting. It is being quoted currently at an $84,000 price. This compares with about $280,000 for the current standard RAF fighters now in production. Folland offers the following comparisons between the standard RAF fighter and the Gnat:

• **Cost.** Twenty Gnats fitted with engines, armament and full equipment can be built for the cost of six standard fighters.

• **Man-hours.** Twenty-five Gnats can be built in the same number of man-hours

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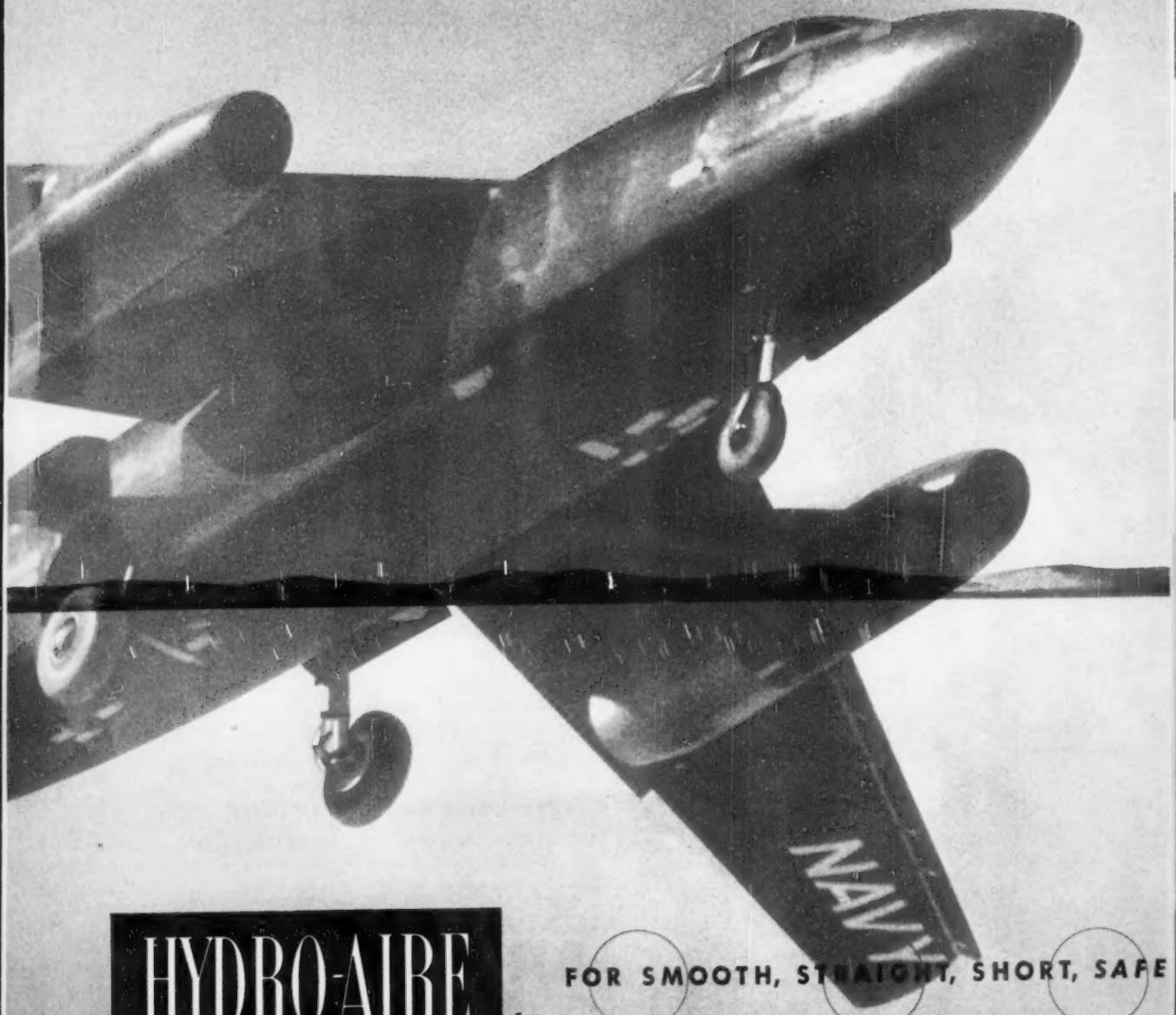

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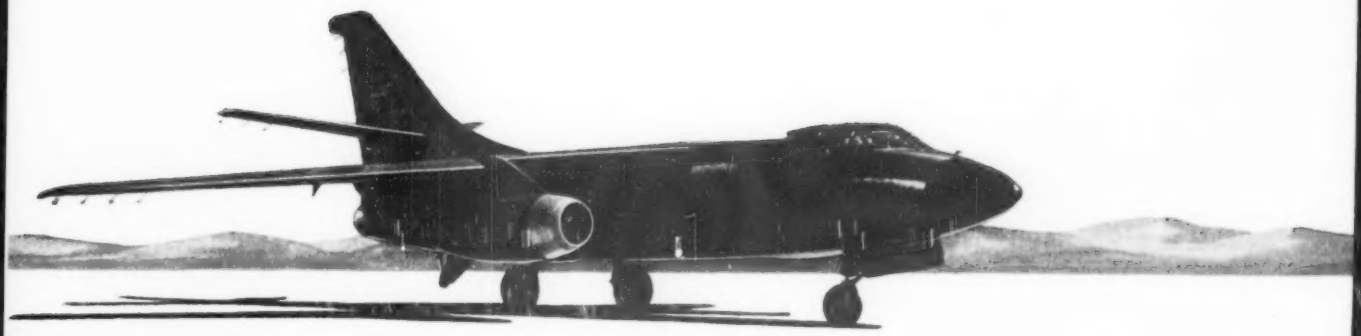
Listed below are 6 clearcut reasons why Hytrol provides more airpower for the taxpayer's dollar



1. HYTROL SAVES TIRES: performance records prove savings in tire wear of 30% and more.

2. HYTROL ELIMINATES BLOWOUTS due to skidding; and a blowout can cost much more than just a tire!

3. HYTROL INCREASES AIRCRAFT UTILIZATION: Hytrol users report a marked reduction of unscheduled repairs.

4. HYTROL MINIMIZES RUNWAY MISHAPS due to overshooting, swinging, or late take-off rejections—and safety pays off in dollars!

5. HYTROL CONTROLS BAD RUNWAY CONDITIONS: ice, rain, slush, snow... all these bad-weather "skid gremlins" are controlled by Hytrol's anti-skid action.

6. HYTROL SAVES FUEL: cuts down excessive taxiing after unnecessarily long landing runs.

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A Bell-designed autopilot enables this submarine hunter and killer to hover motionless for long periods of time while crewmen maneuver its dipping sonar.

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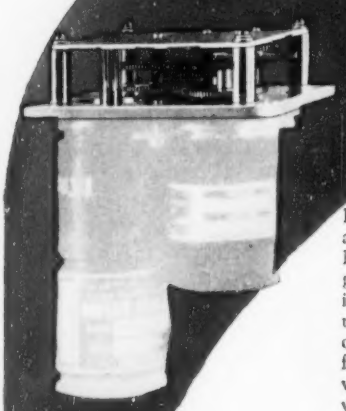
vital to the performance of a Bell autopilot.

When ultra-precision at maximum performance and minimum weight is a mandatory speed requirement in computers, servomechanisms, or other instrumentation systems, select a Norden Precision Reduction Gear Box.



PERFORMANCE

Reduction ratios to 20,000:1 have been attained without sacrificing performance. Friction is almost without identity since the greatest reduction requires less than .01 in-oz. of input torque. Acceptance tests of units now in production indicate backlash of less than 0.25° at the output. All gearing for a gear box with a 20,000:1 reduction weighs only 6.5 ounces and is contained within an area 2-3/32" x 2-3/32" x 7/8" exclusive of mounting flanges.

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Materials used for gears and pinions are dependent upon the respective requirements for such factors as average life expectancy, reduction ratio, operational speed, and torque. The same consideration of requisites is given in determining bearing materials and/or the size and type of precision anti-friction ball bearings to be incorporated. Lubricants are selected for specific temperature range operation and maximum protection against corrosion. Die cast, stamped sheet metal or machined housings are chosen for maximum durability, minimum weight and relative costs.

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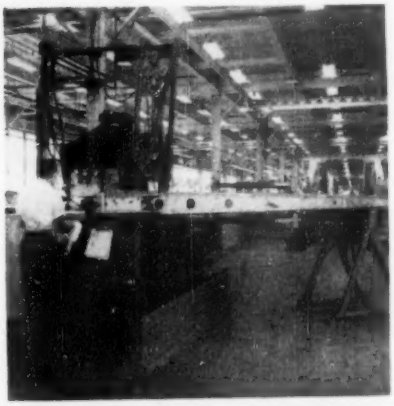
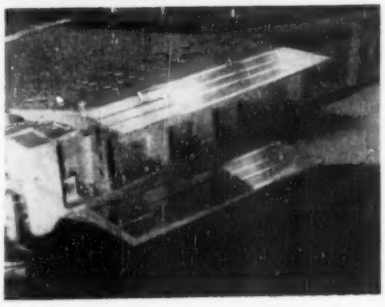
as five standard-type fighter aircraft.

• **Firepower.** The 20 Gnats built for the same cost as six standard fighters can bring to bear forty 30-mm. cannon against enemy bombers compared with 24 cannon by the sextet of four-gunned fighters. This is particularly interesting since the top brass of the Ministry of Supply and Royal Air Force express their definite disinterest in the Gnat on the grounds that it "lacks lethality" compared with standard fighters.

Because of the solid wall of official British disinterest in the Gnat project, Folland proceeded to build the Midge prototype to have a flyable article available to provide tangible proof of the Gnat principles, even though it had to use a 1,640-lb.-thrust engine to push its 4,000-lb. gross weight.

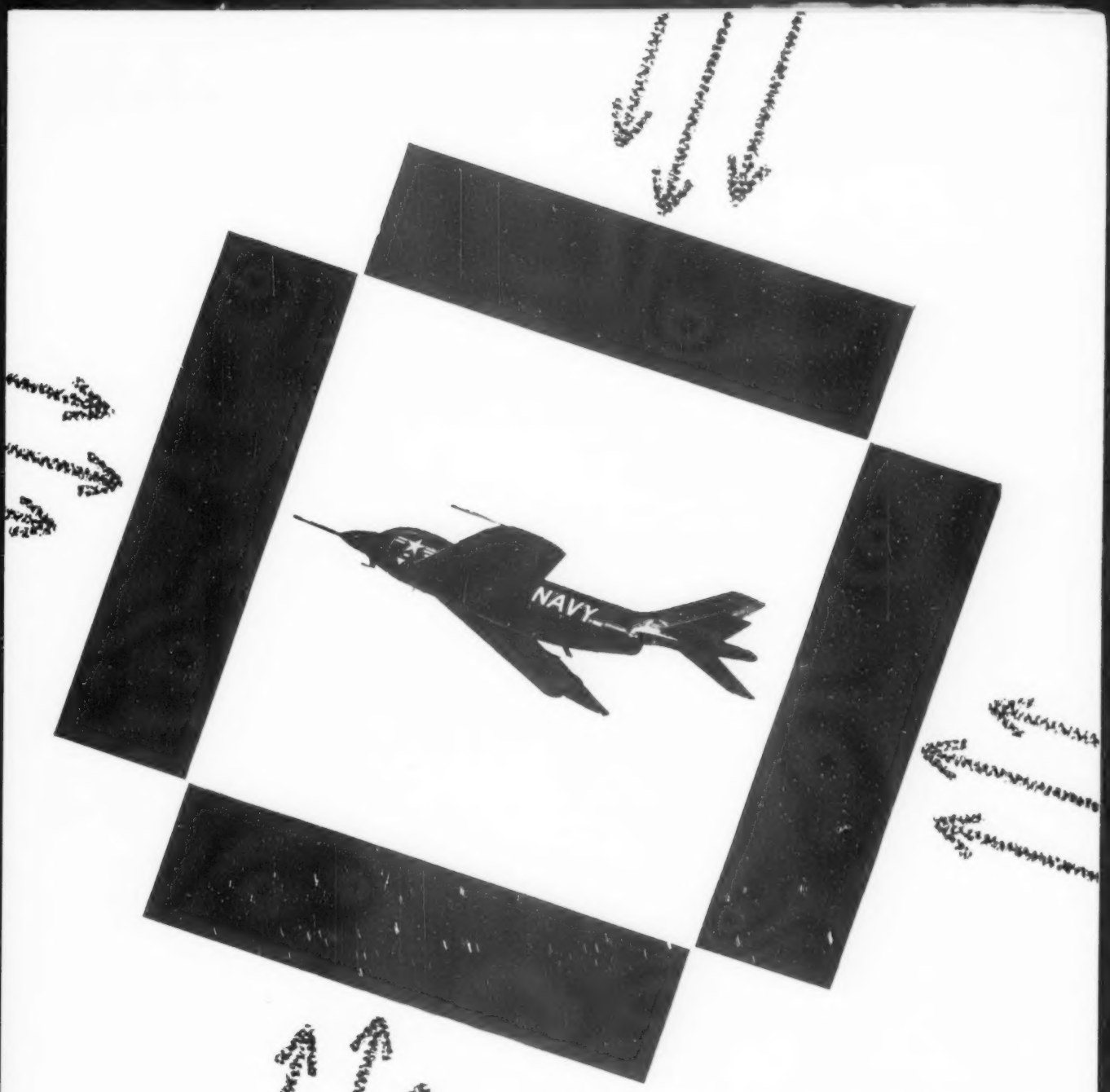
The Midge performance has underscored the wisdom of this decision. In 35 days since its first flight last Aug. 11, the Midge had flown 30 hr., including three days at the RAF Boscombe





F-100 Wing Work

F-100 Super Sabre wing attach fitting (lower photo) is step-cut on special machine built by North American Aviation. Tool uses Helicarb gang cutters specially made for the job by Sonnet Tool and Mfg. Co., Hawthorne, Calif. A cut 6 in. wide by ½ in. deep is reported possible with the cutters, using dampers on the part to reduce vibration. Feed rate of machine now is 48 in./min. Closeup shows steps in upper and lower fitting members on either side of single piece wing root web. The stepped fitting is milled from the root portion of the wing skin.



SWEDLON Armor protects the pilot in the McDonnell F3H

The F3H Demon, carrier-based jet fighter being produced by the McDonnell Aircraft Co. of St. Louis, Mo., now embodies another feature that contributes to the safety of the pilot in combat.

The all-important human factor, the pilot, is now protected at the most vulnerable points of the cockpit by Swedlow Laminate XIG–112, approved under MIL. Spec. A-17856 (Aer) Armor fragm. non-metallic—on the floor, as protection against flak—in the backrest, as protection from bullets—and as protection for the vital electronic controls. For information on this and other Swedlow laminate applications, contact the Swedlow plant nearest to you.

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DOUGLAS A4D SKYHAWK

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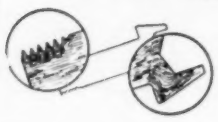

Cold-heading and rolling threads after heat-treating, adds great strength by forcing the grain-flow to conform to the actual contour profile of Briles fasteners.

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Dallas, Texas EDWARD SOSTETKE

Down test center when it made 18 flights in the hands of eight service pilots, a remarkable demonstration of serviceability.

▶**Flight Test**—Squadron Leader E. A. Tennant, Folland's chief test pilot, reported on the first phase flight testing as follows:

"An outstanding feature of the aircraft is the good elevator control. At speeds from 90 knots to over .95 Mach, this control offers first-class response with stick forces never more than 6 lb./G. This is quite outstanding for a manual control and justifies the advocates of small T/C ratios for tailplanes and elevators to improve control at high subsonic speeds. Over 6 G has been pulled at these high speeds and Mach numbers, and no 'dig in' tendencies resulted. At the stall, which is innocuous, no vices have revealed themselves, and recovery is straightforward and easy.

"Stability is just sufficiently positive throughout the C. G. range to make the aircraft a fine ground attack machine. It is a very good gun platform with or without dive-brakes extended.

"As a fighter it is delightful to get back to a size of aircraft that gives a pilot a feeling of intimacy and snugness so often missing these days. The landing gear width presents no troubles and even in a crosswind it is easier to land than a Spitfire. Touchdown speed is 105 knots, but this seems higher because of the aeroplane's small size. No braking was used at the Farnborough air display simply to conserve the brakes and tires. This gave the impression that the Midge needed a long landing run."

▶**No Flaps**—The Gnat design obviously had to compromise on some features to obtain its simplicity and performance. Among these are the lack of flaps, the substitution of a single channel VHF standby for a complete 10-channel standby and the pilot's seat adjustment which can be operated only on the ground.

However, the Gnat carries a surprising amount of equipment including a drag parachute, 10-channel VHF radio, lightweight airborne radar, IFF equipment, distance measuring equipment, and ejection seat and a pressurized cabin.

Folland reports it has received excellent cooperation from equipment makers in helping design weight out of components.

Employes' Children Win Scholarships

The first four full-tuition scholarship awards have been made to children of employes by Solar Aircraft Co. under its newly established scholarship fund. At the same time, Chance Vought Air-

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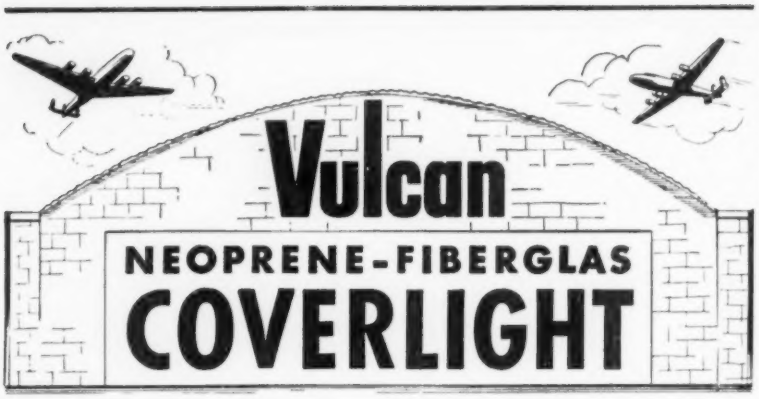

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craft, Inc., has announced competitive tests for its two scholarship awards for 1954-1955.

• **The Solar scholarships** provide $1,600 a year for four years to children of company employes who meet standards set by a scholarship committee and who have plans for college study in engineering, business administration or one of the physical sciences having a direct industrial application. First winners were Joseph Colonell and Don Robert Brusha, of Solar-San Diego, and Sharon McKinstry and Jerry Laverne Dick, of Solar-Des Moines.

• **The Chance Vought scholarships** are open to sons of employes who intend to study engineering or an allied science at an accredited college or university offering a standard four- or five-year course leading to a bachelor's degree. The awards provide full tuition and laboratory fees, plus an additional $500 a year.

NACA Report

A Photographic Method for Determining Vertical Velocities of Aircraft Immediately Prior to Landing (TN 3050)—By Emanuel Rind, Langley Aeronautical Laboratory.

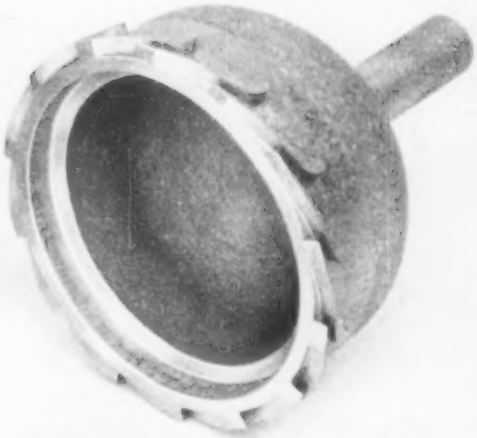
National Advisory Committee for Aeronautics has developed a different photographic method, using a 40-in. focal lens, for collecting statistical data on vertical landing velocities. No instrumentation installation is required at the airport, and there is no interference with normal flight operations at the field.

Probable maximum error for the system is stated as ± 0.31 fps. velocity; the system is limited to conditions of at least 1,000-ft. visibility with sufficient light to produce photographic images.

This report summarizes one phase of the NACA's continuing investigation of landing-gear loads and design criteria.

"No comment!"

—*Editor and Publisher*



Nozzle for jet plane's air conditioner which keeps cockpit temperature down.

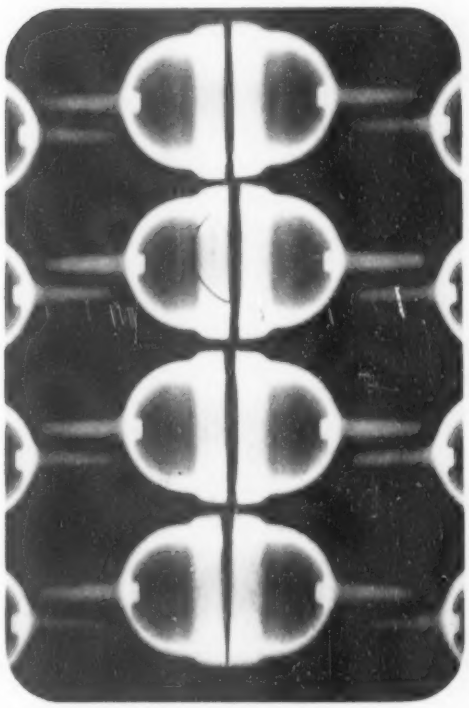
RADIOGRAPHY *says:* "O.K. to Machine"

COMPLEX MACHINING is required to transform this casting into the precision nozzle of a jet plane's air conditioner.

Fourteen intricate, curved vanes are cut in the rough casting's rim. Tolerance is .002 inch. This means plenty of high-cost machine time—which could be a total loss if it is left to the cutting tools to find any defect in the casting.

Radiography avoids that . . . shows up shrink or other faults before machining is begun. Only those castings proved sound are worked. Time and money both are saved.

Easy to see, isn't it, how radiography pays off? And if you would like to know other ways it can help you, like improving yield in production runs, here's a suggestion: Talk it over with your x-ray dealer. Or, if you like, drop us a note saying, "Send me a free copy of Radiography as a Foundry Tool."



Radiograph shows castings with "shrink"—saves costly machining time.

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another important example of Photography at Work.

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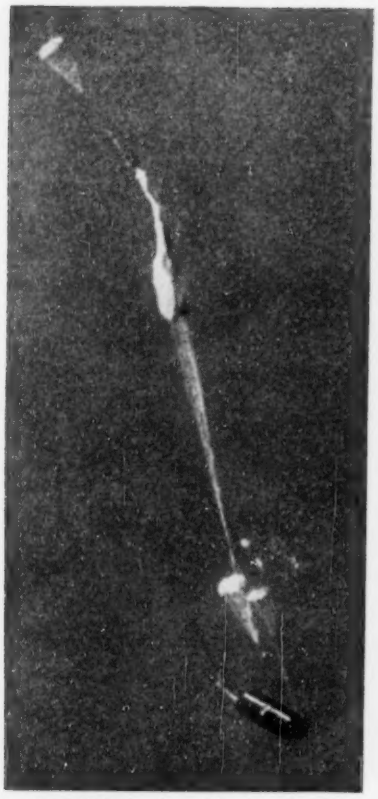
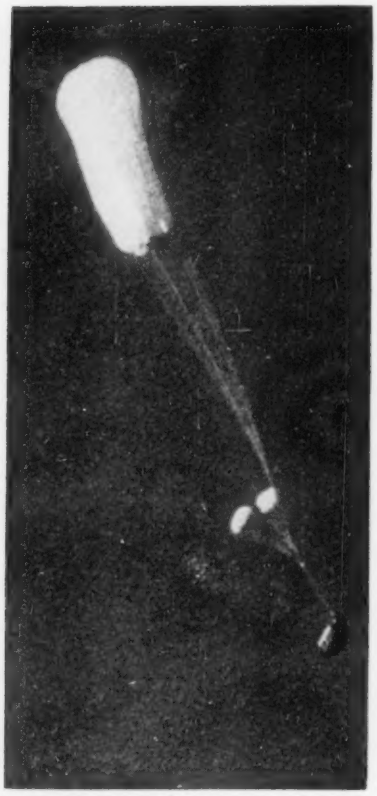
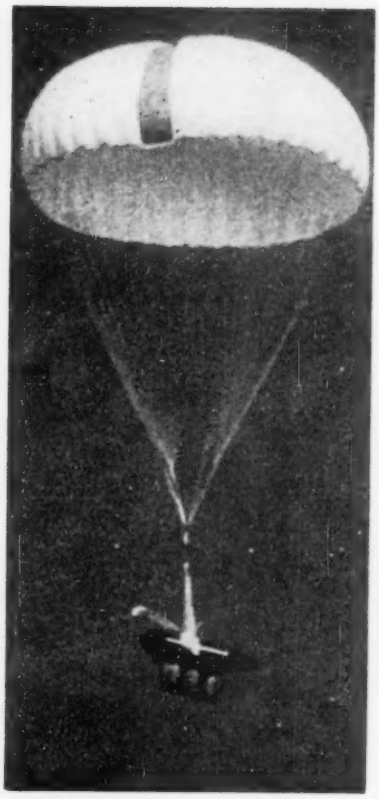


1. **JETTISONED** after giving an aircraft additional boost on takeoff and climb, the de Havilland Super Sprite cold rocket pops a . . .

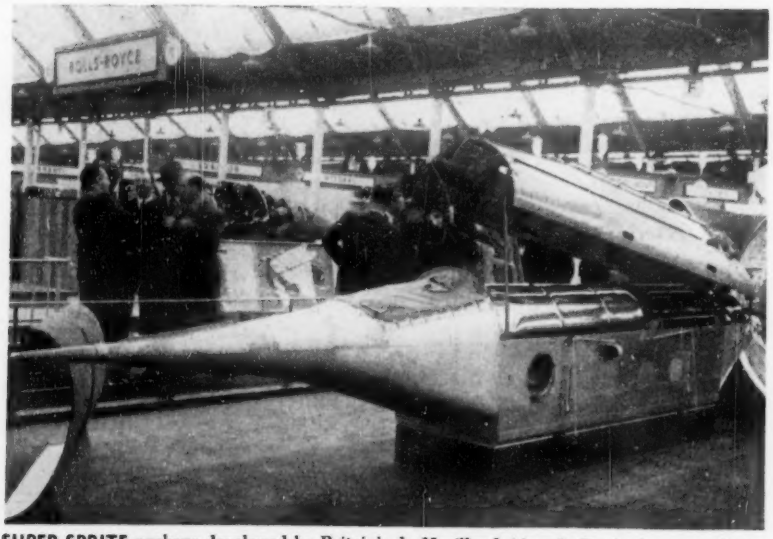


2. **PILOT CHUTE** that drags out the main parachute. Two smaller chutes stabilize the recoverable DH package as it makes its . . .

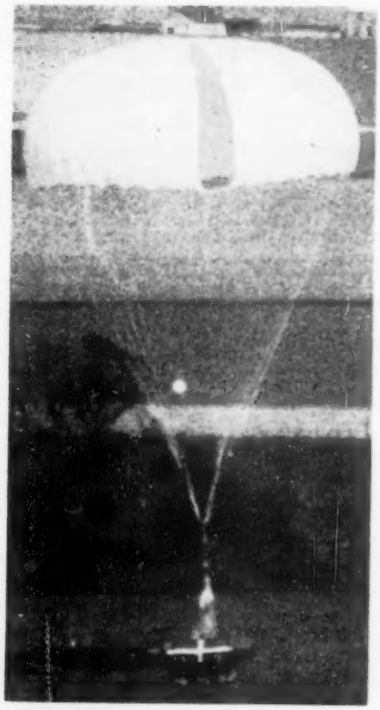


3. **DESCENT** with main chute fully open. Rubber cells at bottom of the device are beginning to inflate to cushion impact of . . .

Britain's DH Super Sprite Cold Rocket Hits the Silk



SUPER SPRITE package developed by Britain's de Havilland Aircraft Co. is shown ready for installation, either in bombers with heavy loads or jet fighters for fast climbs to interception altitude. The new cold rocket puts out 4,200 lb. of thrust for 20 seconds.



4. **LANDING.** Note shock absorbed by the air-filled rubber cells. Jettisoned package now can be recovered, refueled and reused.

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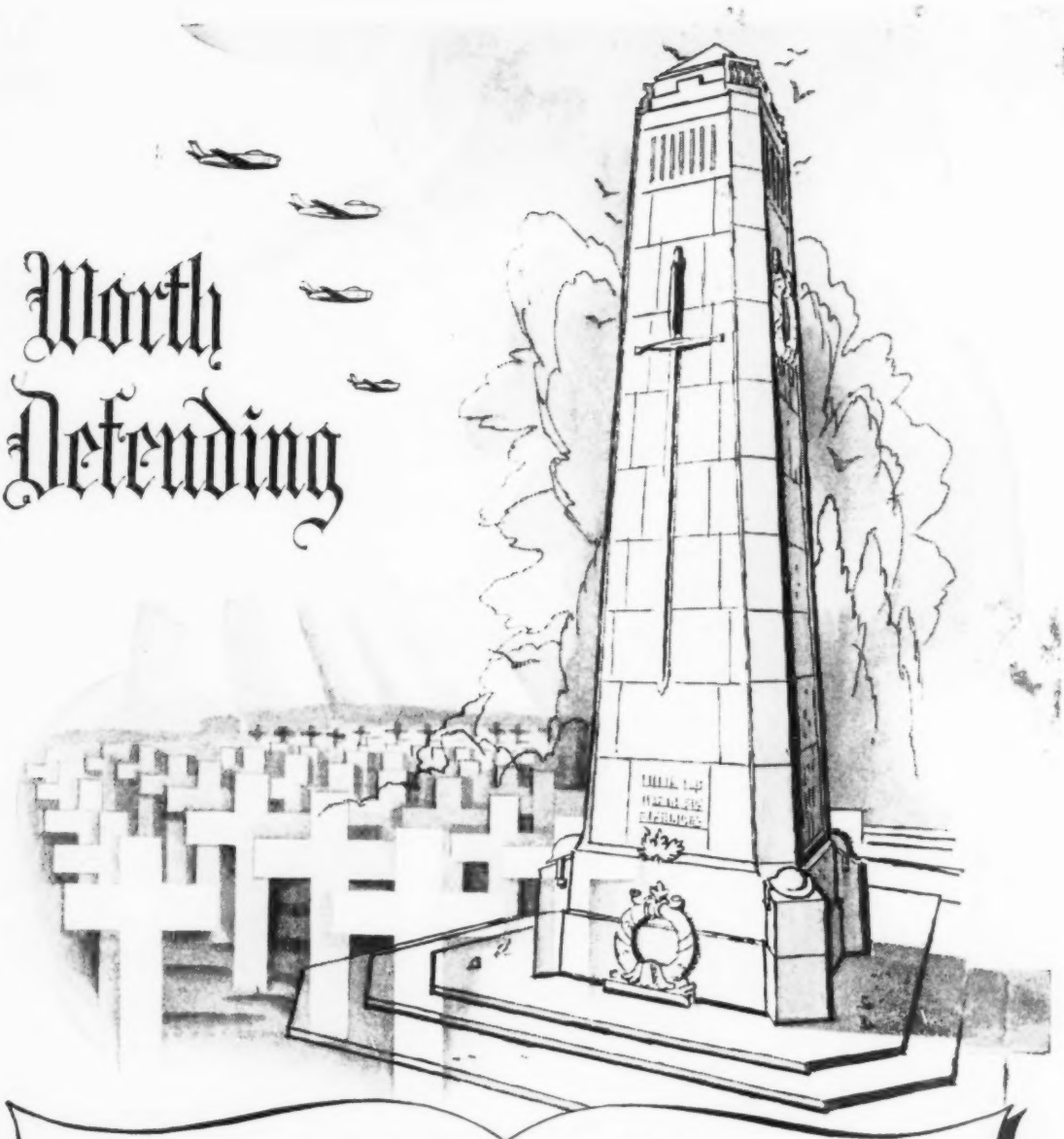

"To you from failing hands we throw the torch,
Be yours to hold it high;
If ye break faith with us who die
We shall not sleep though poppies grow
In Flanders fields."

And yet, when the parade is over and the last bugle note fades, it is so easy to "break faith" by being lulled into a sense of "*nothing will happen here*" . . . to let victory and freedom go by default.

"Hold high the torch" — but will we do it? We will if we respect the sacrifices of our soldiers, sailors and airmen through the great struggles in the past. Think it over in your mind . . . what they died for is worth defending *now!*

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Radio Sextant Takes All-Weather Fixes

● Clouds and overcast do not blot out microwave radiation from sun, which this equipment depends on.

By Philip Klass

Cedar Rapids, Iowa—A new navigation device—called the radio sextant—automatically takes accurate fixes on the sun, even through the overcast. Slated for its first airborne evaluation soon in a Wright Air Development Center B 29, the device could find use in long-range navigation of guided missiles and aircraft.

The WADC radio sextant was developed here by Collins Radio Co. It is an adaptation of a shipboard model developed for the Navy BuShips. Radio sextant work at Collins, sponsored by the Navy, has until recently been under security wraps.

A large land-based radio sextant now operating near Cedar Rapids is giving sun fixes with maximum errors of only 2-3 minutes of arc 95% of the time, with a probable error of one minute, according to Dr. David McCoy, project chief.

Neglecting other sources of error in an airborne radio sextant, this figure would correspond to a probable error of one nautical mile.

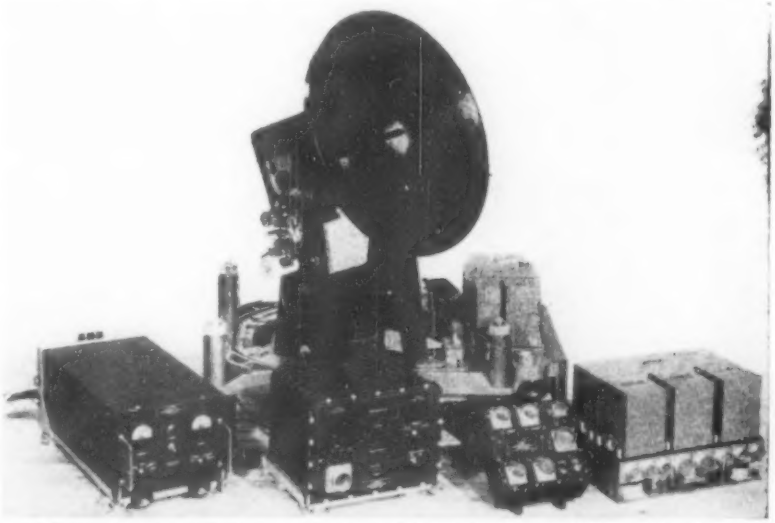
▶**Hot Spot Radiation**—The radio sextant is able to track the sun's movement by virtue of solar radiation in the microwave region, produced by thermal agitation. Solar radiation was first detected in Britain and the U.S. during the war at a variety of microwave wavelengths. The fact could not be disclosed until late 1944 and early 1945 because of security.

Within a year after this disclosure, Collins began its research in radio astronomy, followed by an investigation of the feasibility of the radio sextant. The first operational model, for shipboard tests, operated on a 1.8-2 cm. wavelength, selected because of low atmospheric absorption at this frequency. Collins is now experimenting with an 0.87-cm. radio sextant at its Feather Ridge test station situated 10 miles northeast of Cedar Rapids.

The station is located on the highest ground in the area to permit sun tracking down to the horizon.

▶**Radar Techniques Used**—At first glance, the radio sextant looks much like a tracking radar, with its parabolic

EXPERIMENTAL RADIO SEXTANT, under test by Collins Radio near Cedar Rapids, is housed in a war-surplus Navy searchlight. Sextant tracks sun, even through overcast.



AIRBORNE RADIO SEXTANT, mounted on stabilized platform, could be used for longrange navigation of aircraft and missile. Photo shows components of airborne unit.

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for temperature testing in the laboratory or in the plane...

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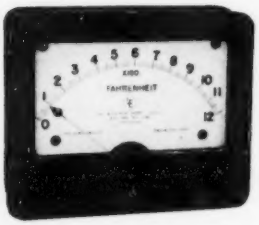
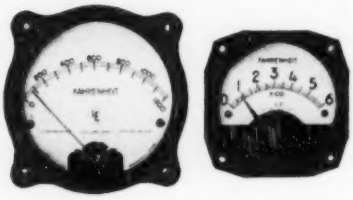


MODEL 58PY, above, has been used extensively by leading motor car manufacturers for road testing on the "Proving Grounds" — where performance counts. Housed in rectangular bakelite case, has 6" hand drawn scale and is fully compensated for ambient temperature. Made in ranges listed below, with suitable thermocouple materials.



MODEL 23B, left above, has same type movement as our aircraft pyrometers. Housed in flanged, 4" round, bakelite case for panel mounting.

MODEL 20B, right above, has same 3" steel case and same movement as our aircraft panel indicators. Both are fully cold-end compensated and available in standard ranges listed, with suitable thermocouple materials.

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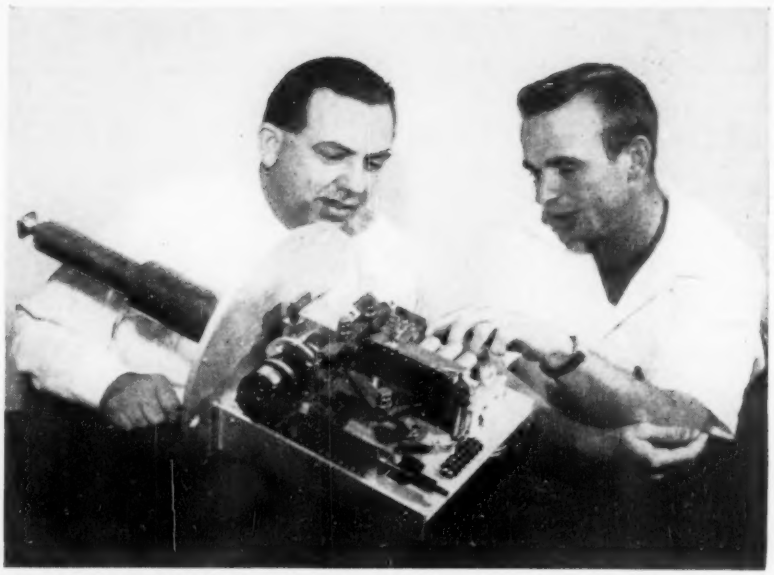


RADAR-TYPE CONSTRUCTION is used in Collins' experimental radio sextant.

antenna, rotating antenna feed, and waveguide plumbing. There is, however, one important difference which complicates equipment design. The radio sextant does not transmit any energy, acting merely to receive solar radiation.

This radiation is low-level "noise," resembling "Johnson noise" generated in a radio receiver by thermal agitation in resistors and grid circuits. This characteristic of solar signals imposes sensitivity and low-noise circuit design requirements "which in some respects are more exacting than for a radar receiver," McCoy says.

The 30-rps. antenna feed nutation, which in effect causes the antenna to scan around the sun's periphery, also serves to modulate the solar signal at the same frequency, distinguishing it from internal receiver noise. When the antenna is pointed directly at the sun, the received signal has no scan frequency modulation but when slightly displaced, the signal is modulated at 30 cps. Error voltages for the antenna tracking servo systems are obtained from phase-sensitive detectors.

▶**Sun Fixes**—A radio sextant sun fix provides altitude angle and azimuth position, enabling the navigator (or automatic navigation computer) to establish an airplane's line of position. Two such lines of position are needed to determine a position fix. This could be accomplished by taking two sun fixes, separated by perhaps a 5-10 minute time interval, then translating the second line of position by the distance the plane has traveled in the interval as established by dead reckoning.

The entire operation could be performed automatically by tying in the radio sextant to an adaptation of dead reckoning computers such as the AN/ASN-6 developed by Ford Instrument.

▶**Gyro-Stabilization Needed**—The radio sextant which WADC will evaluate is mounted on a gyro-stabilized platform to take out unwanted airplane motions and provide a horizontal reference for measuring sun altitude angles. In a production design, gyro stabilization could be built into the sextant antenna itself, reducing size and weight.

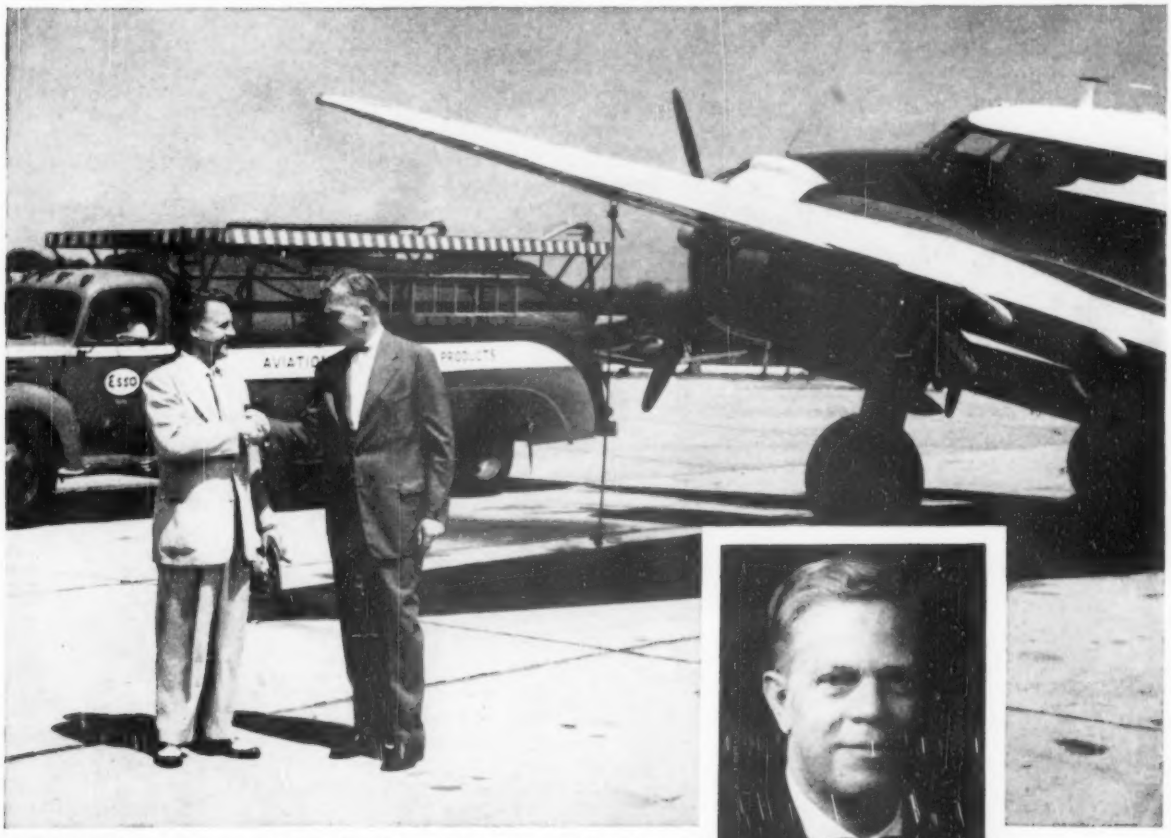
The present USAF model, which operates at 1.9 cm., employs a 24-in.-dia. antenna dish and weighs about 100 lb., exclusive of the gyro platform. If the 0.87-cm. wavelength proves to have sufficiently good all-weather performance, the size of the airborne antenna could be reduced to 15 inches. On this basis, an airborne, stabilized, sextant could be built for approximately 100-150 lb., McCoy estimates.

When the radio sextant takes to the air, it requires the familiar radome for protection against the windstream. The principal problem here is obtaining low angular distortion, McCoy says. Radome attenuation of the solar radiation is not too serious.

▶**Tests Continue at Feather Ridge**—The experimental 0.87-cm. radio sextant at Feather Ridge, housed in a war-surplus Navy searchlight, has a 48-in.-dia. antenna which gives it a beamwidth of only one-half degree, according to G. R. Marner. The sextant has demonstrated the ability to track the sun through rain and storm, indicating that the 0.87-cm. wavelength will show a high degree of all-weather reliability, Marner says. On several occasions, however, extremely violent thunderstorms have knocked out the sextant.

Collins is currently recording the

Atlantic Aviation opens new division at Philadelphia International Airport!



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Mr. Albert Mosley, Manager of Atlantic Aviation, Phila., Pa.

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sun's azimuth and altitude angles every 15 minutes, as established by the radio sextant, then comparing them with the sun's theoretical position (as established by astronomers), to determine tracking errors. Based on 2,000 such readings to date, the sextant's probable error is one minute of arc.

The Feather Ridge sextant is also being used to measure atmospheric refraction of the solar signal when the sun is near the horizon.

▶ **Moon Maybe, Stars Doubtful**—If the radio sextant is to be useful at night, another source of celestial radiation is needed. The moon, whose temperature is only around 250K (Kelvin) compared to 6,000K for the sun, is a very much weaker radiator. However, recent Collins experiments with the 0.87-cm. sextant indicate that moon tracking may be feasible.

Asked about the possibility of using "radio stars," McCoy explained that their radiations are extremely weak in the microwave region, with strongest radiations at wavelengths of 10 cm. and above. This would dictate antenna dish sizes 10 times bigger than at present, highly impractical for airborne use.

However, McCoy says that Collins is closely following the work of radio astronomers to keep abreast of new finds in this field.

Douglas Buys New Alternator Test Stand

A new "feedback" test stand for aircraft alternators, which uses alternator output power to drive the machine under test instead of dissipating it in a load bank, has been announced by United Manufacturing Co., Hamden 14, Conn. Douglas Aircraft Co. has bought two of the stands, United says.

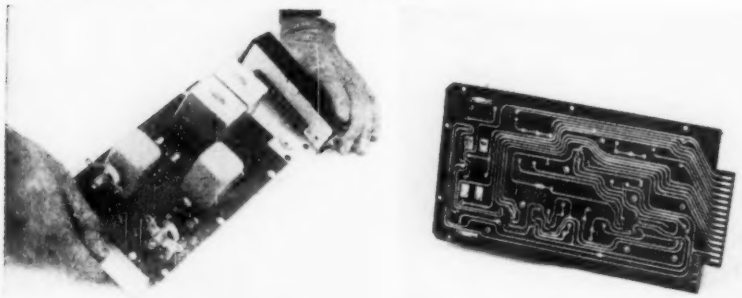
The new feedback test stand, developed under AF sponsorship, is a half to a third smaller, lighter and less costly than the equipment it replaces, according to the manufacturer. The test stand comes in two models, one capable of handling alternators rated 60 kva. or less, the other for machines rated 120 kva. or less. The alternator under test can be operated at 150% rated load for five minutes, 200% load for five seconds at unity power factor, United reports.

▶ **How It Operates**—The alternator under test and a second alternator (operating as a synchronous motor) are mounted on dual output pads of a variable-speed drive powered by an auxiliary motor, which makes up power losses within the two machines. The driving alternator (synchronous motor) must have an equal or larger rating than the machine under test, and should have similar, though not necessarily identical electrical characteristics, United says.

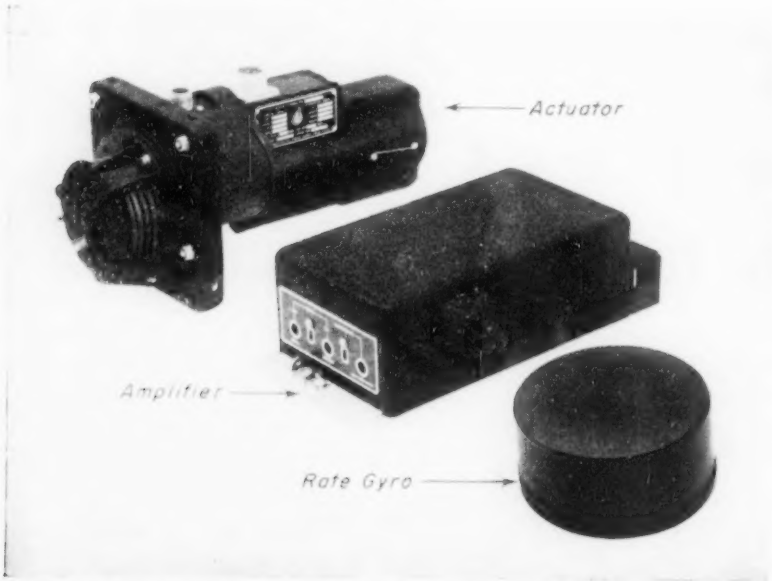
Loading the alternator under test is accomplished merely by pressing a button until the desired load is reached. Power factor can be varied from 0.2 lag to 0.75 lead by means of a rheostat knob which controls field on the driving alternator. Use of the synchronous motor load instead of conventional load bank results in a slight change in waveform, primarily an increase in third harmonic.

United reports that its new test stand can also be used to test constant-speed alternator drives, regulators and control panels, as well as for electrical systems check-outs.

No Tubes, No Wires, No Spirals



MILITARY-TYPE CONSTRUCTION, employing magnetic amplifiers and printed circuits for high reliability, is used in newest version of Lear Arcon, automatic rudder control designed to prevent inadvertent spirals in lightplanes.



ARCON consists of an actuator, amplifier and rate gyro. First production units will be ready in November. Arcon weighs 10 lb. and sells for $790.

New Mag Amplifier Has Gain of 50,000

A new 400-cycle magnetic amplifier, with power gain of approximately 50,000, suitable for with 2-phase 115-volt motors, is one of several recently announced components suitable for servo system use.

The new Model SMA 4-103 mag amplifier is a half-wave, self-saturating type with a response time of approximately 0.005 sec. Input impedance is 10,000 ohms, and the unit can be operated between temperatures of −55C to 71C. Manufacturer is Ketay Manuf. Corp., 555 Broadway, New York 12, N. Y.

Other new servo components include:

• **Phase-sensitive magnetic demodulator,** Type 808, has a drift of less than 1% over an ambient temperature range of −55C to 85C, and can be operated up to 100C with slightly higher drift, according to manufacturer. Unit can be

a honey of a story

Two exclusive Martin production developments—Metal Honeycomb and Structural Adhesive Bonding—now appear to be among the most important cost-cutting innovations available to the aircraft industry.

Both are employed in production of the USAF B-61 Martin Matador. Result: The lowest known cost per pound of any military aircraft now in production.

With Martin Honeycomb: A wing section traditionally requiring upward of 1,100 fabricated parts can be produced with as few as 90!

With Martin Structural Bonding: The production time required for airframe fastenings, with tooling and preparation—often accounting for as much as 60 percent of the total—may be cut to less than 25 per cent.

It's a honey of a story, and there are many more under wraps or on the way. That's why—

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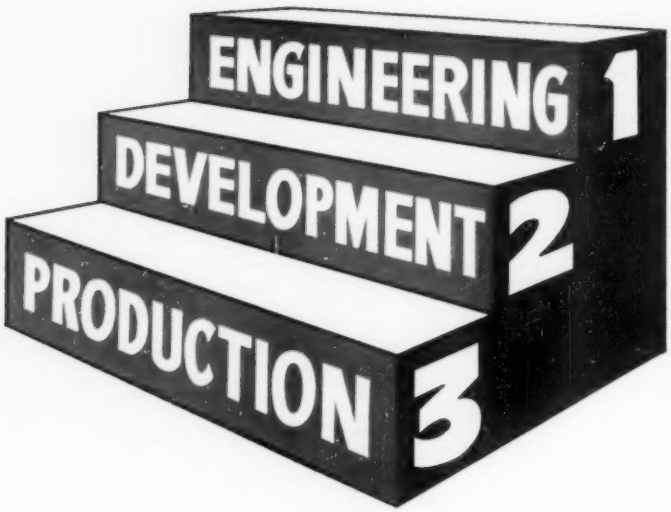

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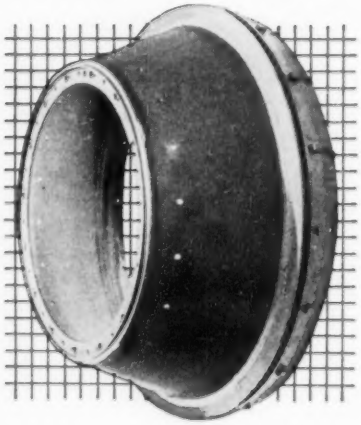

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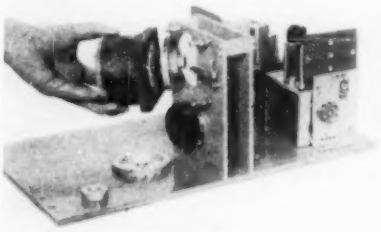
operated at carrier frequencies of 50 to 5,000 cps. Manufacturer: Polytechnic Research & Development Co., Inc., 202 Tillary St., Brooklyn 1, N. Y.

• **Miniature clutch,** called Micro-Clutch, measuring less than 1 in. in dia. and 2¼ in. long including shaft extensions, can transmit a torque of 8 oz. in. with

a control current of 65 ma. Unit also comes in clutch-brake models. Manufacturer: Magtrol, Inc., 533 S. Niagara St., Tonawanda, N. Y.

• **Packaged servo system,** including amplifier, motor, and gear train, with screwdriver adjustments for adapting to a variety of load conditions, is available in 400- or 60-cycle models, priced at $360 from Feedback Controls, Inc., 1332-34 No. Henry St., Alexandria, Va.

• **Servo building blocks,** a complete line of precision electrical and mechanical servo system components for 60-cycle use, including servo and summing



amplifiers, phase detectors, gear boxes, gears, and cams, is available from Link Aviation, Inc., Binghamton, N. Y.

VHF Transceiver Sells Under $200

Poor-man's VHF transceiver, selling for under $200 including antennas, offers three crystal-controlled transmitting channels, continuous tuning reception between 108 and 136 mc.

The transceiver, which operates from a dry battery pack, can be used as standby equipment for lightplanes with existing VHF equipment, or in craft not now equipped. Transceiver weighs 4 lb., battery pack weighs 1.75 lb.

Manufacturer is Springer Aircraft Radio Co., Sky Harbor Airport, Indianapolis, Ind.

Navy's new F9F-9 capable of supersonic speeds in level flight.

Simplified Wing Construction Keynotes Design of Newest Grumman Navy Fighter

Simplification is the key note of the F9F-9 Tiger design. The entire top and bottom skins of the wing are machined from single sheets of aluminum thus greatly reducing the number of parts, time and man hours usually involved in complex wing assembly.

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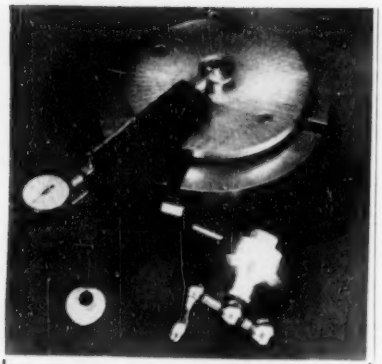

High Precision Cams Missile—Radar —Computers

Missile Research Manufacturing Corp., Van Nuys, Calif., has designed a cam grinding machine utilizing mathematical formulas and based on a one-to-one ratio that permit an operator to maintain these tolerances: ±.0002-in. on offsets and ± 0-deg., 0-min. 05 sec. on angularity. The firm also is making precision instruments for inspecting cams in service, employing a master cam and able to reveal precise amount and point-of-fault in minutes instead of hours previously required. Ample facilities for quantity production.

Vendor to:
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FILTER CENTER

▶**Goodbye to Black Boxes?**—"Black boxes," much-used term for avionic equipment, may be replaced by "white boxes" as transistors replace tubes, say Minneapolis-Honeywell engineers. They point out that transistorized equipment has little heat to dissipate and might better be painted white to reflect heat radiated by adjoining hot objects.

▶**Printed Waveguide Interest Grows**—Judging from the turnout of avionics and aircraft manufacturers representatives at the recent printed-circuit waveguide symposium in Boston, industry interest and activity in this field is growing. Conference was sponsored by AF Cambridge Research Center and Tufts College. Speakers reported that printed circuit techniques, such as Federal Telecommunications Lab's Microstrip and Airborne Instrument Lab's Stripline, are being applied to a variety of microwave components. X-band was the highest frequency mentioned by the speakers, but there were indications of printed circuit work at 13-14 kmc.

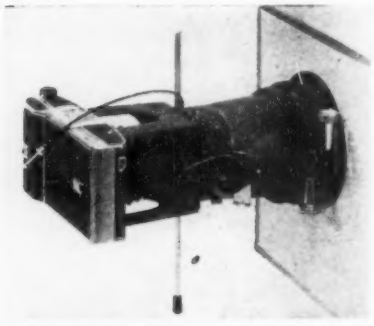
▶**Power From Thermocouples?**—Thermocouples, previously able to supply only infinitesimal amounts of electrical power, may be able to generate larger, more useful amounts as a result of recent advances in the state of the art, a Bell Labs spokesman says.

▶**Portable Frequency Standard**—National Bureau of Standards has developed a portable 1-mc. frequency standard which it says is stable to within "a few parts in 100 million per day." NBS says unit is compact, rugged, and employs inexpensive, commercially available components. Summary Technical Report 1891 gives details.

▶**Super Shaker**—New 20-kw. electronic power supply for vibration shake table permits ground simulation of aircraft and missile vibration. The latter can be telemetered down, then played through power supply and fed to shake table which subjects components to identical vibrations. LM Electronics Inc., Los Angeles, which developed the power supply for Hughes Aircraft Co., calls it the largest of its type ever built.

▶**U. S. Viscounts Use British ADF**—First three of Capital Airlines' new Viscounts will use the new British Marconi AD-7092C automatic direction finder, company reports. Selection of ADF for remaining Capital Viscounts will follow evaluation of first three Marconi says. The British ADF reportedly uses Arinc-type tubes.

▶**VHF Channel Doubler**—Airplanes equipped with Aircraft Radio Corp.'s Type T-11B VHF transmitter can double their number of channels to 10, by means of new Type 16950 crystal adaptor. ARC's address: Boonton, N. J. —PK



Speedy Scope Pictures

Oscilloscope photos "right now" are made possible by new Fairchild adaption of the Polaroid-Land camera which develops print internally in one minute. Device will take full-size photograph of 5-in. cathode ray tube, and mounts on any scope with a 5¾ in. bezel. Camera has a 75-mm., f/1.9 oscillo-anastigmat lens with shutter speeds of 0.01 to 1 sec. Fairchild Camera and Instrument Corp., Robbins Lane, Syosset, L. I., N. Y.

COLD 50° F LOWER THAN MT. EVEREST'S CAN'T FAZE THIS G-E SILICONE RUBBER!

G-E CLASS 500 silicone rubber retains flexibility at —120 F

Specifically designed for high-altitude and arctic aircraft applications, General Electric CLASS 500 silicone rubber compounds have become the standard in the industry. Unmatched in low-temperature serviceability by any known elastomer, including other silicone rubbers, they make ideal gaskets and seals for airframe openings, aerodynamic balance surfaces, ignition cable, external limit switch covers and other applications where low-temperature operation is vital. When you specify General Electric CLASS 500 silicone rubber, you can count on properties such as these:

- ★ **Flexibility at 120 degrees below zero F**
- ★ **Low compression set and quick recovery at sub-zero temperatures**
- ★ **Serviceability over a 600-degree range (—120 to 500 F)**
- ★ **No plasticizers to boil out at *high* temperatures**

Ask your fabricator

about G-E CLASS 500 silicone rubber for low-temperature applications! Compounds are available in a variety of hardnesses, or special compounds can be made to your exact specifications from G-E silicone gums. For the names of experienced fabricators and for complete technical data, just send the coupon!

See your "Sweet's File for Product Designers" for complete details on G-E silicones.

G-E silicones

fit in your future

GENERAL ELECTRIC

General Electric Company
Section 2461-2A
Waterford, New York

Please send me product data on G-E CLASS 500 silicone rubber, including a free copy of *Imagineering with Silicone Rubber* and list of fabricators. I am chiefly interested in:

1 ( ) Molded gaskets, bushings
2 ( ) Molded boots, sleeves, bellows
4 ( ) Shock mounts
5 ( ) Sponged products
9 ( ) Extruded seals, tubing
10 ( ) Reinforced ducting, hose
11 ( ) Sheets and blankets
20 ( ) Wire and cable insulation
30 ( ) Coated tapes, cloths, sleeves

Name_____ Position_____

Firm_____

Street_____

City_____ Zone____ State_____

IN CANADA: Mail to Canadian General Electric Company, Ltd., Toronto

HOW PROBE AND DROGUE SYSTEM could be used by jet tanker like Boeing 707 for multiple refueling is shown in artist's rendering.

FRI Pushes Refueling Rig Production

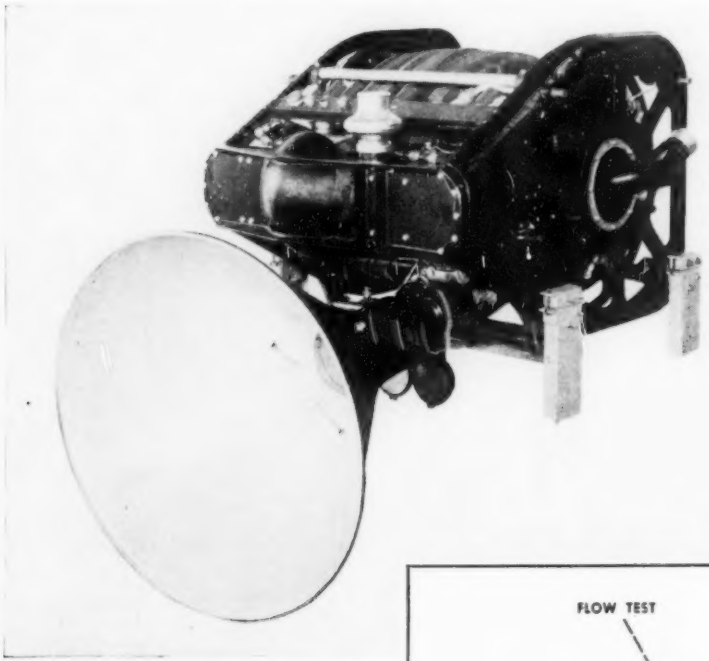
By George L. Christian

Baltimore—Flight Refueling, Inc., is swinging into full production of the A-12 probe and drogue inflight refueling system at its new plant here at Friendship International Airport, with a $9-million backlog to keep it busy.

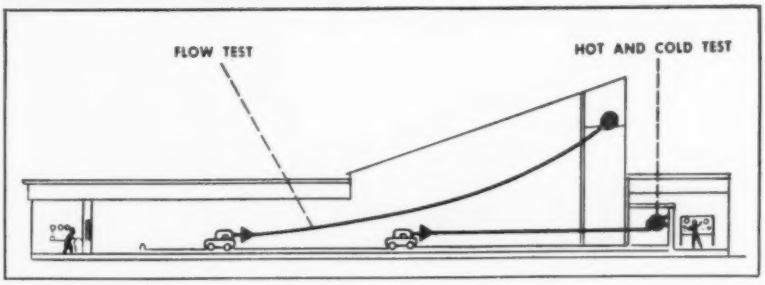
First production models will go to USAF, to be followed soon by units for the Navy (AVIATION WEEK Jan. 26, 1953, p. 26; Nov. 1, 1954, p. 21).

Current production models have a fuel flow of 200 gpm., but FRI is pushing an active development program to achieve higher flow rates, which would cut down actual refueling times and allow for greater operational efficiencies.

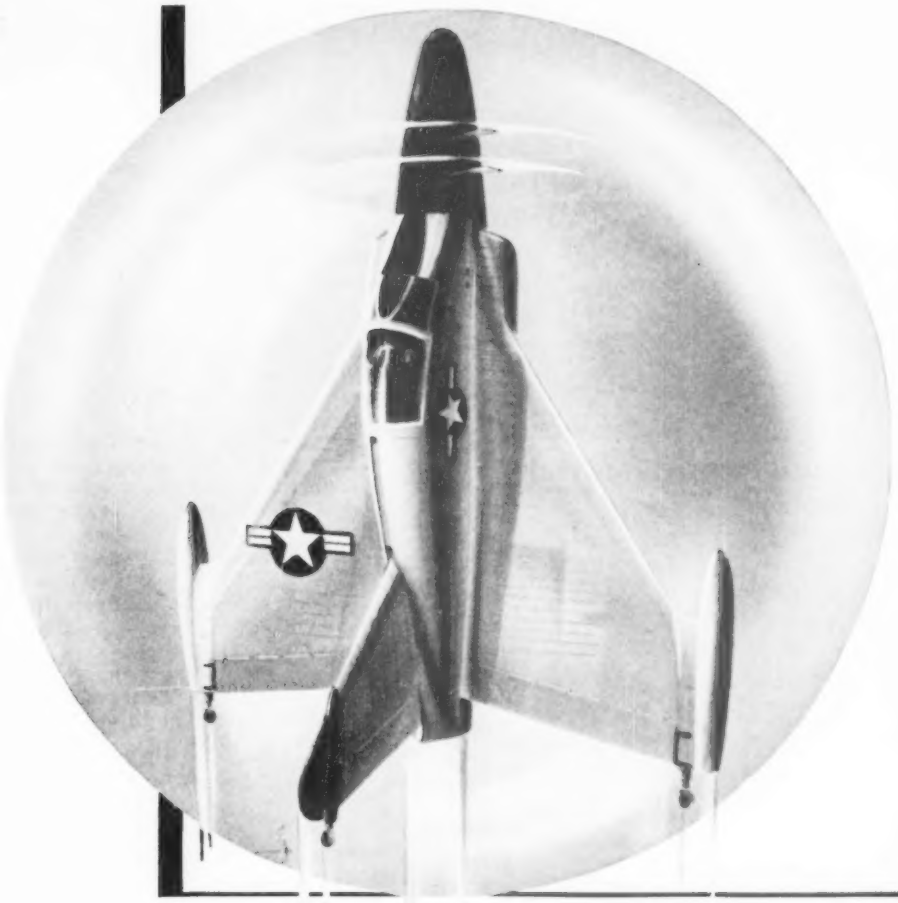
Development work is also progressing on improving a line of fuel auxiliary equipment, including a new, lightweight pipe connector. Other ancillary aircraft products developed by FRI as

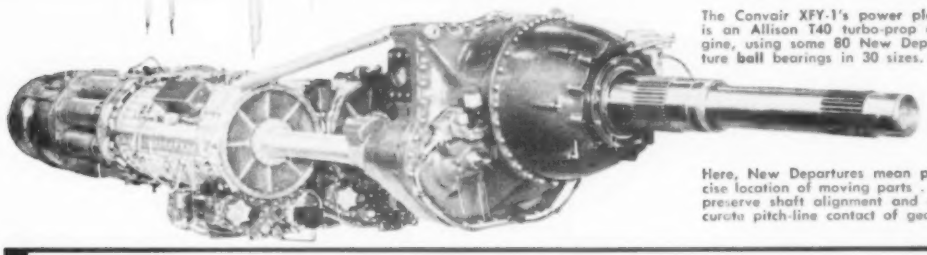


A-12 HOSE REEL UNIT made by Flight Refueling is 600-lb. package containing tanker's complete refueling system.



WET LAB is special building for operational tests of refueling equipment.





The Convair XFY-1's power plant is an Allison T40 turbo-prop engine, using some 80 New Departure **ball** bearings in 30 sizes.

Here, New Departures mean precise location of moving parts . . . preserve shaft alignment and accurate pitch-line contact of gears.

BEARINGS for a "Pogo" Pilot

Vertical take-off! Tailfirst landing! Fighter action! It's the Navy's newest—the Convair XFY-1 "pogo stick."

In its Allison T40 turbo-prop engine, some 80 New Departure **ball** bearings assure positive positioning of moving parts. And in the hub mechanisms of the Curtiss-Wright Turbolectric propellers, New Departures carry heavy loads.

Throughout defense and industry, you'll find New Departure **ball** bearings ideal for countless applications. So whatever your bearing problem, *talk with your New Departure engineer . . . now!*

NEW DEPARTURE
BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT
Plants also in Meriden, Connecticut, and Sandusky, Ohio
In Canada McKinnon Industries Ltd St Catharines Ontario

STRATOJET FEEDS STRATOJET—KB-47 (right) refuels B-47 via probe and drogue.

F-84S NESTLE UP to KB-29 tankers during 2,500-mi. Tokyo-Bangkok nonstop flight.

IN NAVY TESTS, North American AJ-1 tanker refuels Grumman F9F Panther at sea.

a logical outcome of investigating problems of high-pressure fuel handling include float switches, pressure relief and check valves, refueling valves and ground refueling nozzles and adapters.

▶ **Wet Lab**—Unique facility at Flight Refueling's plant here is a "wet" laboratory tailored to simulate as nearly as possible all actual conditions that occur during flight while pumping fuel from reel through line to drogue and probe at "flows of hundreds of gallons per minute."

Purpose of the 42-ft. high, sloping roof section of the building is to allow hose reel units to be raised high enough so that hose and drogue may trail at the same angles they assume under actual flight conditions.

▶ **Playing Safe**—Because of the hazards involved in such testing, performed with aviation fuels such as JP-4, Flight Refueling has taken elaborate precautions to eliminate all sources of possible danger and also has designed into the facility complete safeguards to personnel and property.

C. W. Newhall, FRI's president, told AVIATION WEEK of the careful safety planning that has gone into the facility. Some of the items:

- **Fuel storage tanks** are underground, to keep fuel safe from possible blast or fire.
- **Cooling system** keeps fuel that circulates in the test lab at temperatures well below its flash point.
- **Building is constructed** so sides and roof will blow out relatively easily, minimizing the destructive effects of a confined explosion.
- **Test personnel are protected** from the lab proper by thick slabs of reinforced concrete into which have been set very thick, bullet-proof glass observation ports.
- **Floor of the building slopes** to drain spilled fuel into a long trough running lengthwise down the center of the test area, from which it is quickly disposed of.
- **Twin exhaust fans** at the end of the lab change the air in the building completely every two minutes (Air Force requirements are once every three minutes, says FRI).
- **Explosion-proof lights,** switches and wiring are used throughout the lab.
- **All fuel pumping and valving** equipment is remotely located outside of the test lab proper.

The entire lab, which occupies about 8,700 sq. ft. of floor space, has hot and cold chambers for testing equipment under widely varying temperature situations. The building contains laboratories to check and test materials and components under all environmental conditions, and an experimental shop.

▶ **Main Plant**—Two other, more conventional buildings on the 16-acre site (12 additional acres are available for further expansion) are the main plant and a "dry" lab.

The 60,000-sq. ft. main plant houses the company's engineering, accounting, personnel, medical, cafeteria and executive offices on one side and complete manufacturing facilities on the other, all under one roof. In the plant proper are a large variety of machine tools, including turret lathes, heavy duty hydraulic presses, drill presses, grinding and milling machines and cutting and welding equipment.

Newhall points out that the new plant, which only recently got into full operation, "was designed from the ground up for the development of flight refueling systems and special auxiliary devices used in aviation fuel systems."

The dry lab covers some 4,500 sq. ft. and houses equipment to provide such

DIE-CAST...*believe it or not...*

at extremely low cost!

Too complicated to be die-cast? Some might think so. Yet today Eclipse-Pioneer Foundries are handling this aircraft instrument housing frame to perfection as a *production* die-casting job . . . and saving 32% in labor and burden and 97.5% in material over previous sand-casting methods.

This is only one example of how we can deliver top quality (and at low cost) in both ordinary and "impossible" die-castings of all kinds. Here are some of the advantages we offer you:

1. **LOWER FINISHING COST**—We die-cast to such close tolerances that you save machining time and money. So *final* cost . . . the only one that really counts . . . comes *down.*
2. **LIGHTER WEIGHT**—There's far less waste metal for you to machine off . . . and unmachined areas can be cast thinner for additional weight savings.
3. **BETTER FINISH**—Surfaces on unmachined parts are much smoother.
4. **VERSATILITY**—We handle magnesium or aluminum with equal facility.
5. **ANY QUANTITIES AT LOW COST**—Long runs are not necessary in order for us to effect savings for you.

If you have felt that die-casting was probably too expensive or too impractical on your work, it will pay you to get our story as it applies to your specific needs. Send coupon today for full details.

Check-Chart Shows Versatility of Eclipse-Pioneer Foundries

PROCESS USED	METAL WORKED	
	ALUMINUM	MAGNESIUM
Sand	√	√
Plaster	√	√
Shell Mold	√	√
Die	√	√
Permanent Mold	√	√

MAIL COUPON TODAY

Eclipse-Pioneer Foundries

Division of Bendix Aviation Corporation
Teterboro, N. J.

Yes, I'd like complete information on your die casting service as it could be applied to our work.

Name_____

Title_____

Company_____

Street_____

City_____

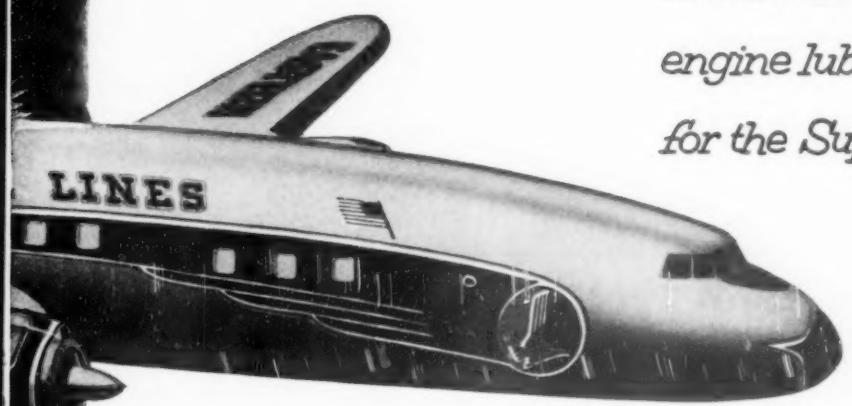
Zone_____ State_____

West Coast Office:
117 E. Providencia Ave., Burbank, Calif.

a New
★★★★★ FLY - EASTERN A.

Eastern adds Constellation to the Skies!

. . . Once again Sinclair is chosen for dependable engine lubrication...this time, for the Super-C.



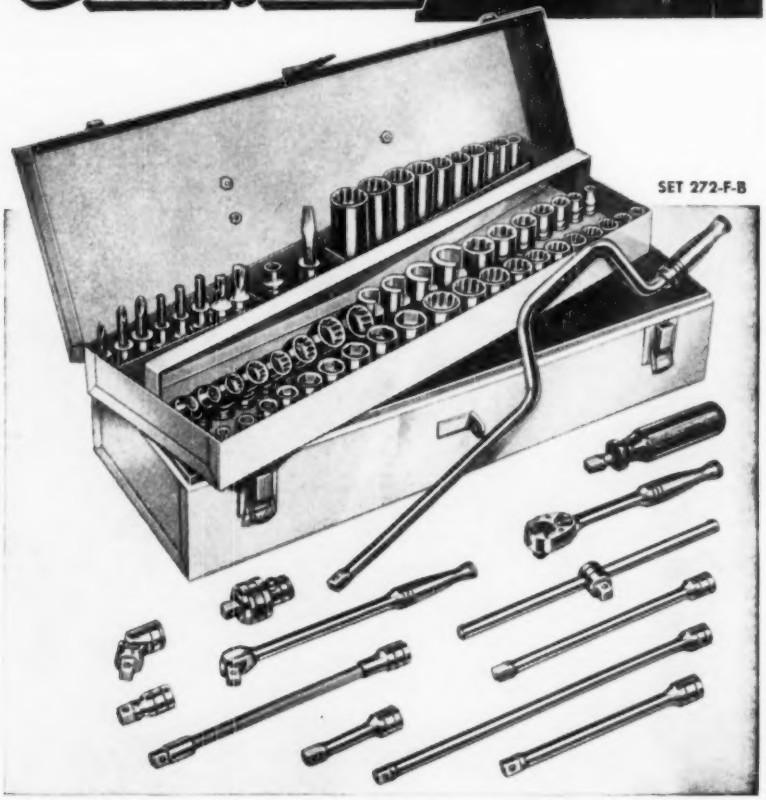
The newest member of Eastern's Great Silver Fleet has taken to the skies. The latest in Constellations, Eastern Air Lines' SUPER-C is designed to give Eastern passengers faster service with the same dependability proven over *billions* of passenger miles.

As with every airline, Eastern stresses reliable performance – brought about by dependable products. Proof of the aviation industry's confidence in Sinclair may be found in the fact that *45% of the aircraft oils used by major scheduled airlines in the U. S. is supplied by Sinclair.* Why not place *your* confidence in Sinclair Aircraft Oil?

SINCLAIR AIRCRAFT OILS

SINCLAIR REFINING COMPANY, AVIATION SALES, 600 FIFTH AVENUE, NEW YORK 20, N. Y.

Slim-fast-versatile Snap-on* Ferret Wrenches



—for top speed in tight spots

Here is one of the most adaptable, time-saving wrench kits you can put in the hands of maintenance or production workers—a complete set of Snap-on's famed Ferret wrenches. The set includes all handles (3/8" square drive), adaptors, extensions and sockets (1/4" to 3/4"), to speed a wide range of jobs. Handles are long, slim, strong, with patented "Palm-Grip" for real working comfort. 4-way socket grip for quickest handle hook-up. Available through your nearby Snap-on factory branch. Write for Snap-on Industrial catalog and general catalog of 4000 hand and bench tools.

SNAP-ON TOOLS CORPORATION
8020-K 28th Avenue, Kenosha, Wisconsin
*Snap-on is the trademark of Snap-on Tools Corporation.

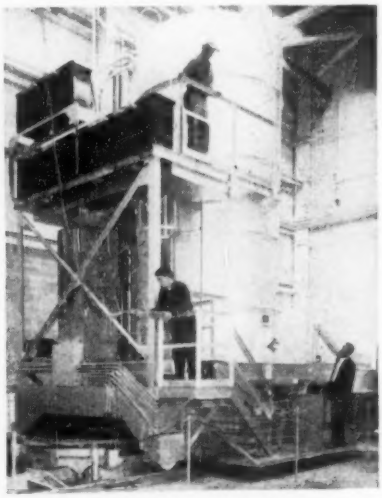
tests as atmospheric and vibration, plus a materials lab. Its purpose is to test all inflight system components without fuel flow.

► **Ideal Location**—Originally located in Danbury, Conn., Flight Refueling saw the necessity of moving to a location adjacent to a large airport in the latter part of 1952 when it received substantial orders of its probe and drogue system from the Air Force.

The present site was chosen for a number of reasons. Among them: The company was able to obtain a sufficient amount of land located just off the end of the 9,450-ft. runway at the airport; and Baltimore presented a good supply of technical and shop manpower.

Newhall is pleased with the location and physical characteristics of Friendship International Airport. He points out that there are few homes in a radius of five miles of the airport, which practically eliminates noise and nuisance complaints. The approaches are excellent, being built on a knob which is the highest land within 10-15 miles. The long runways (longest is the 9,450-ft. strip which ends near FRI's plant) are stressed to take aircraft weighing up to 400,000 lb.

Newhall soon plans to build a taxi strip connecting the long runway with his plant to make it possible to taxi a tanker up to the plant's back door.



Traveling Furnace

New ferrous-metal heat-treat facility at Boeing Airplane Co., Seattle, consists of traveling vertical cylindrical furnace mounted on tracks over recessed loading zone and three 5,300-gal. quench tanks also recessed in floor. Installation will accommodate parts up to 14 ft. long and 60 in. diameter. Traveling furnace, measuring 28 ft. high by 9 ft. in diameter and capable of 2,050F heat, is complemented by similar size 1,450F draw furnace also recessed in floor. Facility was designed and built by Westinghouse.

UNDER ONE ROOF

By James J. Haggerty, Jr.

(No. 3 in a series)

"When you watch these Georgians build airplanes you know why GAP-6 meets its schedules!"

Says James J. Haggerty, Jr., Aviation Staff Writer, Collier's

The first 92½-ton B-47 jet bomber built at Government Aircraft Plant No. 6 (GAP-6) in Marietta, Georgia, was flown 60 days ahead of schedule.

This is exciting because of the fact that GAP-6 was reactivated by Lockheed less than four years ago. From a crew of 229 employees brought from Lockheed's Burbank, California, plant, a total work force of 14,800 has been developed, including more than 7,500 skilled workers.

These Georgia workers at GAP-6 have a spirit, a dedicated drive, a determination to do a good job unmatched in the aircraft industry. Planes built here today require 75% less man-hours than planes built here two years ago.

Take this enthusiastic team of Georgia aircraft workers and match it with GAP-6's overwhelming size (it's the biggest aircraft plant under one roof in the world) and you understand why Marietta is so important to the U. S. Air Force, which has assigned production of B-47's and C-130A assault transports to this strategic aircraft factory.

U.S. Air Force
Govt. Aircraft Plant No. 6

Lockheed
Aircraft Corporation

Georgia
Division, Marietta

(a Lockheed advertisement)

FASTENER PROBLEM

ESNA Z2278
Accessory Mounting Nut

Safe, fast mounting of generators for aircraft engines

This 300 amp d-c generator is manufactured by Jack & Heintz, Inc., Cleveland, for Boeing KC97, Convair C131, Douglas C124 and Fairchild C119 aircraft. Its installation demonstrates how a new ESNA® self-locking nut makes possible a faster, easier and safer method of mounting generators and similar accessories.

The new ESNA Z2278 nut has been designed for use with a keyhole type mounting flange. It is simply inserted through the keyhole slot (Fig. 1) and tightened into the recessed seating cavity. This cavity prevents the accessory from turning under stress, thus providing an extra safety factor (Fig. 2). An enlarged base diameter on the nut provides sufficient area to offset the seating area lost due to the slot in the flange—which the nut must straddle without brinnelling the flange. The ESNA "Z" or beam type locking device (for operating temperatures up to 550° F.) is incorporated in the nut design.

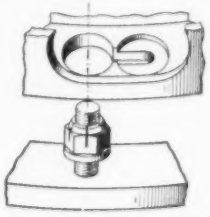


Fig. 1

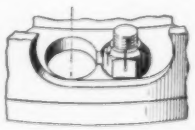


Fig. 2

Send us your fastener problem. ESNA ingenuity—and ESNA quality—will provide the most practical and effective solution.

MAIL COUPON FOR DESIGN INFORMATION

Dept. N52-1125, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

☐ Details on Z2278 ☐ Here is a drawing of our product.
☐ ELASTIC STOP® nut bulletin What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____

PRODUCTION BRIEFING

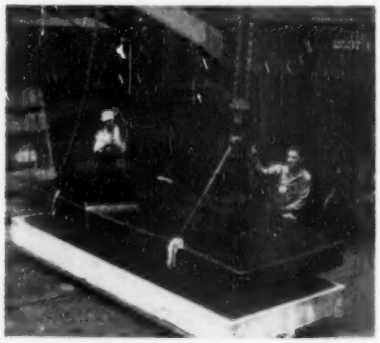
► **Chandler-Evans Division** of Niles-Bement-Pond Co., is building a new test facility at West Hartford, Conn., costing about $850,000, for research, developing and testing aircraft engine fuel system controls. The new building is to be finished in December.

► **Riverside Plastics Corp.,** is putting up a plant on a 3½-acre site in Hicksville, L. I., N. Y., with a bag molding capacity of over 30 ft., 20 presses with capacity up to 10 x 2 x 3 ft., and other facilities.

► **Federal Parachute Co.** is a new, separate division of Fashion Frocks, Inc., Cincinnati, organized to make personnel and cargo chutes as well as deceleration chutes for aircraft and ribbon types for rockets. Fashion Frocks makes aircraft flak curtains, aerial delivery containers, armored vests, survival tents and other sewn defense products. The new division will have headquarters at 1441 Broadway, New York; most of its manufacturing will be done in Hamilton, Ohio.

► **Standard Oil Co. (Ohio)** will build a $450,000 hangar at Cleveland-Hopkins Airport having 27,000 sq. ft. of area to house multi-engine business planes of Sohio and other companies. The Sohio structure is part of a $3.5-$4 million hangar development program projected at the airport.

► **Perkin-Elmer Corp.,** Norwalk, Conn., maker of electro-optical instruments, telescopes, military lenses and special cameras has purchased control of a German optical and aircraft equipment



Ponderous Pad

Huge 4,650-lb. forming pad, heaviest made and cured in one piece, is on its way to Boeing Airplane Co., Seattle, where it will be used in 5,000-ton hydraulic press to shape parts under 1,100-psi. pressure. The pad, measuring 12½ ft. by 5 ft. ⅜ in. by 11 in., was made by U. S. Rubber Co.'s Mechanical Goods Division, Passaic, N. J.

are you fighting space?

connect with cannon!

Are you looking for complete electrical circuit dependability in a very, very small space?

If so, you should use Cannon carefully engineered miniature and sub-miniature multi-contact connectors. In ½ or ⅓ the usual space, they give you up to 50 contacts, the same number as a standard connector, and still retain all the factors of utility, reliability, and mechanical strength found in Cannon's standard size connectors. They are very rugged, easy mating, unusually versatile, neat and compact.

Miniatures—Maximum Dimensions Only 1" x 2"!

High-dielectric insulation. Rack, panel, chassis types . . . receptacles and plugs, standard, pressurized, or hermetically sealed . . . box, wall, or cord mountings . . . for audio, control, and instrument use. G and U sub-miniatures have steel shells. DPA and K miniatures have die-cast shells. Five-ampere gold plated contacts are found in all miniatures and sub-miniatures, excepting U-receptacles, which have steel contacts. Larger contacts having higher current ratings, and co-ax contacts, are in process of development.

Sub-Miniatures—Only 2-5/8" x 39/64"!

first in connectors

CANNON PLUGS

Write for Cannon Miniature and Sub-Miniature Bulletins

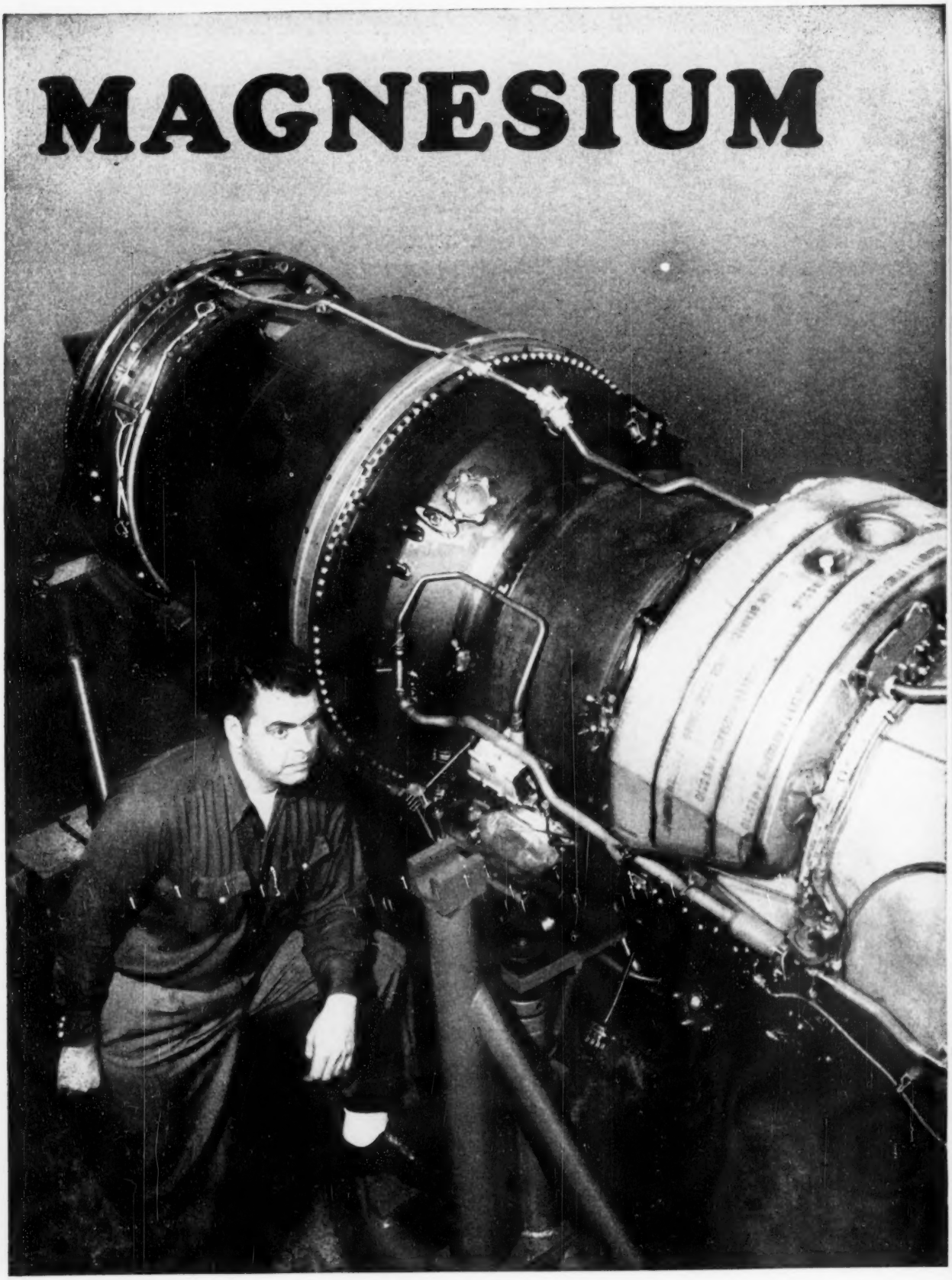
Please refer to Dept. 110

CANNON ELECTRIC COMPANY, 3209 Humboldt Street, Los Angeles 31, California.

Factories in Los Angeles, East Haven; Toronto, Canada; London, England.

Representatives and distributors in all principal cities at your service.

MAGNESIUM

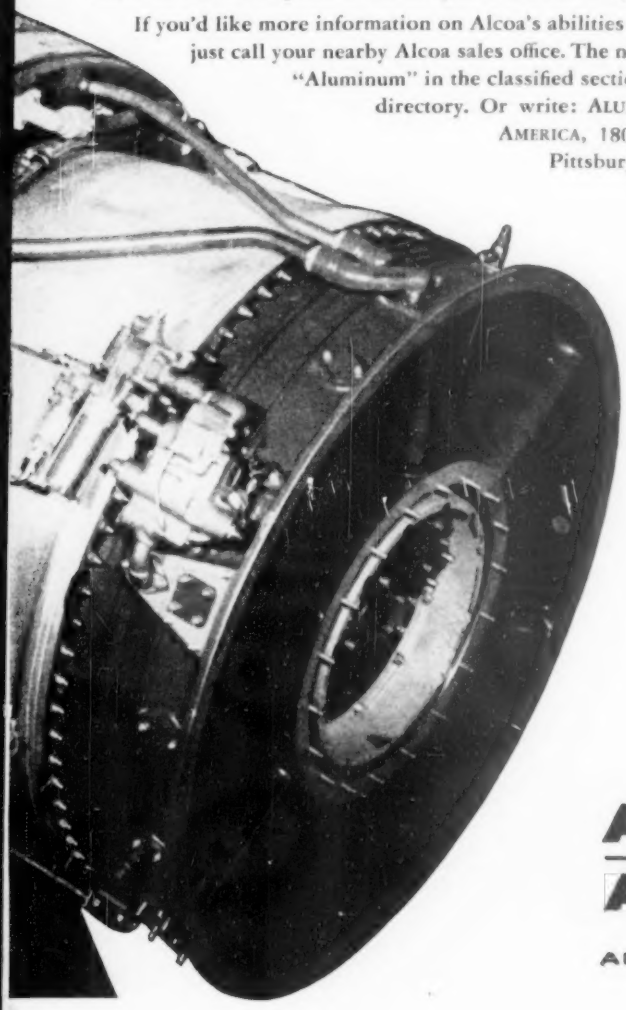


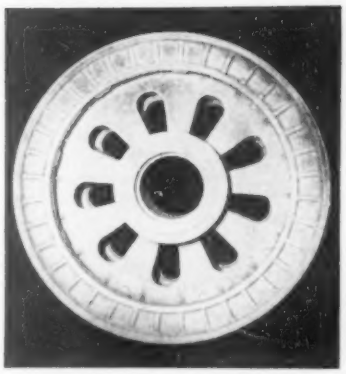
by ALCOA

Aircraft engineers are taking a second look at magnesium! Until recently, this metal was considered best for only minor castings—but sound technical advances have been made in alloying, heating and casting this modern metal.

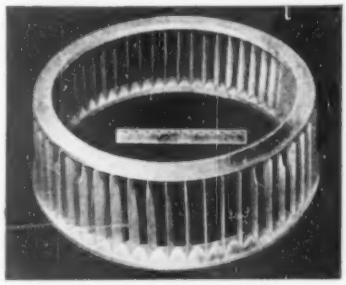
Today, Alcoa operates three magnesium foundries at Vernon, California, Cleveland, Ohio, and Buffalo, New York. At Alcoa's Buffalo Works, magnesium castings weighing upwards of three hundred fifty pounds are being cast! An example is the forward section of America's newest, most powerful jet engine in production—Pratt & Whitney Aircraft's revolutionary J-57. This leading engine builder makes full use of magnesium's strength and lightness. Other applications, too, like gear housings on giant helicopters, are cast of Alcoa® Magnesium. But size alone does not make these castings unique. Alcoa's team of magnesium experts also turns out tiny castings which weigh but a few ounces. The difference is team effort. From start to finish—from alloy selection to final inspection—these specialists watchdog every casting.

If you'd like more information on Alcoa's abilities . . . and facilities . . . just call your nearby Alcoa sales office. The number is listed under "Aluminum" in the classified section of your telephone directory. Or write: ALUMINUM COMPANY OF AMERICA, 1800-L Alcoa Building, Pittsburgh 19, Pennsylvania.

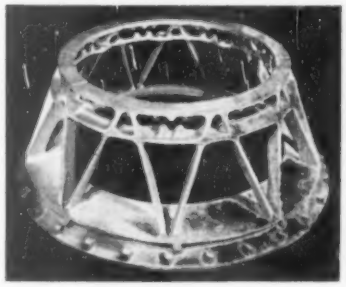




Extra-light aircraft wheels of Alcoa Magnesium—like this type, used on the Air Force's B-47 "Stratojet" bomber.



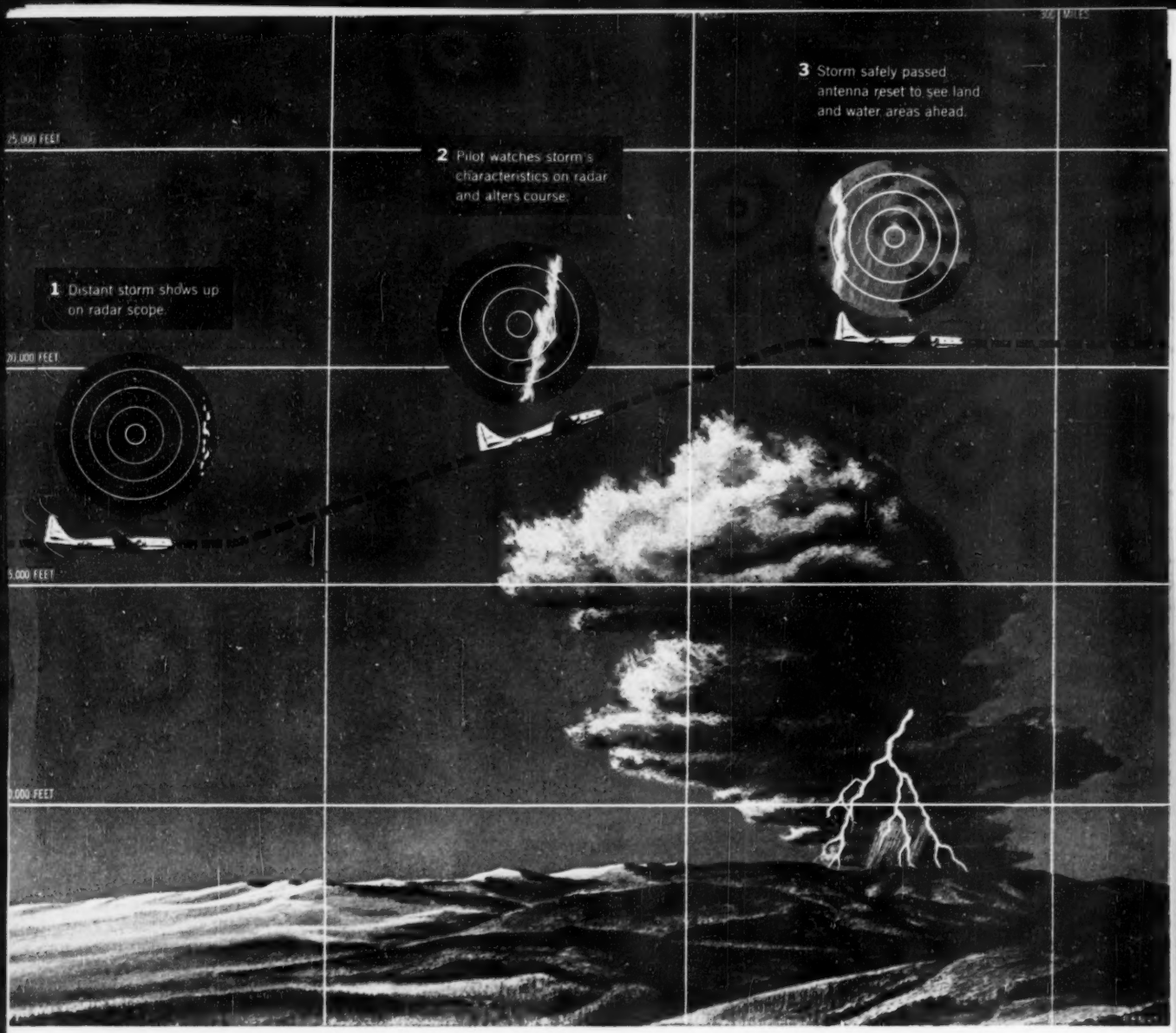
A challenge accepted by Alcoa—pouring the magnesium *around* stainless steel blades to form a solid, complex casting.



Another intricate job, this one a light weight engine support for a Pratt & Whitney Aircraft turbojet engine.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA


3 Storm safely passed antenna reset to see land and water areas ahead.
2 Pilot watches storm's characteristics on radar and alters course.
1 Distant storm shows up on radar scope.

NEW RADAR GIVES USAF POWERFUL EYES

Sees Storms, Obstacles up to 240 Miles Away

THE STORY BEHIND THE STORY:

Unveiled at the National Aircraft Show in September, the new Sperry APN-59 Radar developed for the Air Force made headlines like the one above from coast to coast —and for good reason.

Airmen have needed, and wanted, truly versatile radar. To make navigation more accurate . . . to aid in flying over obscure, uncharted terrain . . . to elude storms . . . to avoid collisions . . . to direct rescues regardless of visibility. But—there has been a problem: Existing radars, to perform all of these functions, have required too much space and added too much weight.

Working with the Air Research and Development Command, Sperry engineers solved the problem by producing a new airborne radar that requires less space than a passenger, weighs less than 150 pounds. And versatile? Despite its small size and weight, this new APN-59 Radar now gives airmen a selection of ranges from 3 to 240 miles—a choice of "looking" straight ahead, below or above—and permits concentrating on any particular area of importance.

Developing the APN-59 Radar brought into play many of Sperry's specialized skills. Electronics—a field in which Sperry's development of the Klystron provided the heart of today's microwave radar. Gyroscopics—to assure "picture" stability in rough, turbulent air. And, of course, sound instrumentation based on Sperry's 40 years of experience in establishing standards for the aviation industry.

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION · GREAT NECK, N. Y.

testing facility. Its acquisition, Bodenseewerk, is located at Uberlingen/Bodensee, near Lake Constance. Built in 1949, it employs over 200 in a 14,000-sq.-ft. facility.

▶ **A. V. Roe Canada, Ltd.,** Toronto, is building a new laboratory for the Gas Turbine Division to be completed this year-end at a cost of about $400,000 for the structure alone. Structural, mechanical, fuel and aerodynamic divisions will be housed in the new facility. The company is ending a subcontract with Frigidaire Products of Canada, Ltd., Toronto, covering jet engine blades, which AvC will now make itself. Change is made, it is understood, to cut production costs.

▶ **Curtiss-Wright Corp.'s** Wright Aeronautical Division office at Detroit has a new address: 4811 Woodward Ave., Detroit 1. Phone: Fairmont 1-1200.

▶ **Webbart Corp.,** Pasadena, Calif., has established a service for testing and certifying packaging in compliance with recently revised policies of certain branches of the Armed Forces.

▶ **Peck, Stow & Wilcox Co.,** Southington, Conn., is expanding its Machine Tool Division to make tools not heretofore produced. Another line of industrial equipment will be added. Plans to terminate production of hardware hand tool lines at Southington are underway. These operations will be transferred to Hartford. Surplus equipment of that division will be disposed of to make room for expansion of the machinery departments.

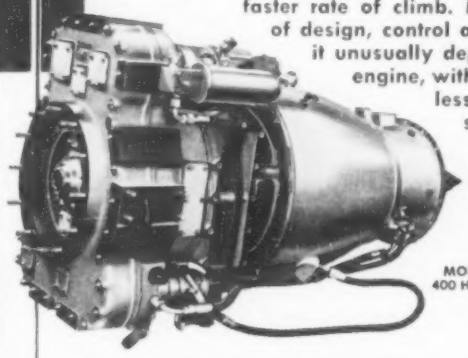
Extra-Wide Extrusion

Widest aluminum alloy extrusion ever extruded flat is this 23-in. 75S section of integrally stiffened skin for horizontal stabilizer of Grumman plane. Part was produced by Aluminum Co. of America on 14,000-ton press at Lafayette, Ind., works. Alcoa can extrude V-sections later flattened for a 34-in. width.

Fastest Helicopter

...Turbine-powered by C.A.E.

SIKORSKY'S XH-39 is notable for high performance—increased cruising speed, improved hovering ability, and faster rate of climb. Moreover, its simplicity of design, control and maintenance makes it unusually dependable. Although the engine, with all accessories, weighs less than 250 pounds, the ship accommodates up to 800 pounds of cargo. Payload space, in addition to pilot, is 81 cubic feet.



MODEL 220 C.A.E. 400 H. P. FIXED SHAFT TURBINE

Latest in a steadily-lengthening list of applications in which C. A. E. gas turbines are performing with distinction is this advanced helicopter, the Sikorsky XH-39. It is powered by the 400-h.p. C. A. E. Model 220 fixed shaft turbine, and holds the world's record for helicopter speed—156.005 m. p. h. A companion model developing 280 h. p. gives exceptional performance to the latest turboprop fixed-wing plane. . . . Two other C. A. E. turbine models—the J69 turbojet and the TC-104 air generator—also are making good on important assignments. The former, powering the Cessna T-37 twin jet trainer and the Ryan Q-2 Firebee target drone, has future promise, too, as auxiliary power for large planes. The latter is the nucleus of the MA-1 portable starter unit for large military jets, and is already in production at C. A. E.

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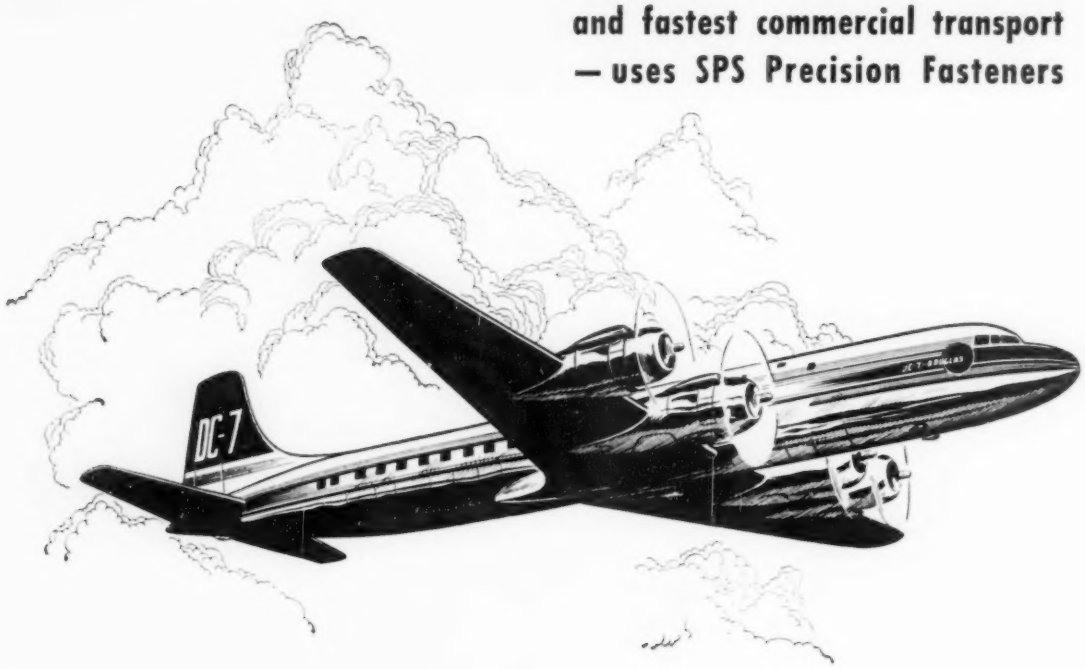

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Many opportunities for recent graduates, and a number of high-level positions are available to experienced engineers. You are invited to send your resume to: North American Aviation, Incorporated, Engineering Personnel Manager–12214 Lakewood Boulevard, Downey, California.

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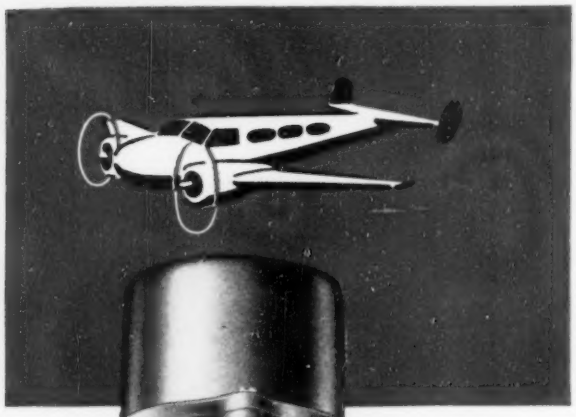
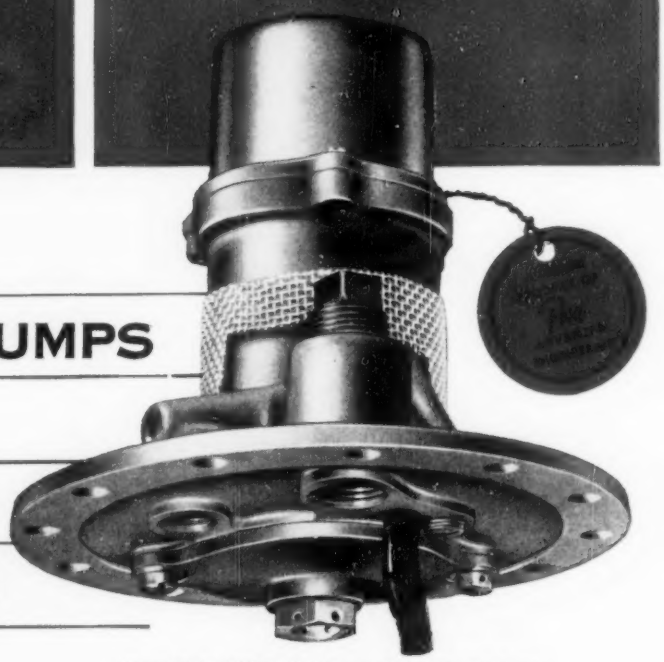


HERE ARE DEPENDABLE PUMPS ADAPTABLE TO MANY REQUIREMENTS



Pesco Model 122723-100 Submerged Fuel Booster Pump. Rated output of basic model 300 pounds per hour at 10.3 psi at 27 volts, 2.8 amps. Modified models for short life requirements are capable of flow of 1,300 pounds per hour at 10 psi at 27 volts, 5 amps. Weight approximately 3 pounds.

Performance requirements for aircraft are the most exacting we have today . . . and Pesco has contributed greatly to dependable aircraft performance through advanced engineering and precision production of fuel and hydraulic pumps.

Typical of these is the Pesco line of small Fuel Booster Pumps which incorporate several important advantages for all aircraft applications.

First is their great flexibility. As an example of this flexibility, the model illustrated was designed basically to pump 300 pounds per hour at 10.3 psi. Slight modifications provide pumping at rates *as high as 1,300 pounds per hour*—with the same constant pressures!

Second, all Pesco submerged fuel booster pumps are driven by motors designed and built by Pesco. This single responsibility of design and manufacture insures full coordination for optimum performance.

Pesco fuel booster pumps have proved their exceptionally high performance and dependability in thousands of installations on military, commercial, and civilian aircraft of all types.

Pesco's complete line of small sized booster pumps for executive airplanes, helicopters, trainers, target drones, etc., provides *advanced* equipment to meet your future requirements.

Call or write the Home Office, Bedford, Ohio for full information on these Pesco products as applied to your specific installation.

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ARDC Contracts

The following contracts have been announced recently by Headquarters, Air Research and Development Command, Baltimore 3, Md.

LOVELACE FOUNDATION for Medical Education and Research, Albuquerque, New Mexico, research and reports on the quantitative emission spectra of nitrogen, carbon dioxide, oxygen and water, job, $37,532.

OHIO STATE UNIVERSITY, Research Foundation, Columbus, Ohio, research and reports on the language of voice procedures, job, $59,793.

UNIVERSITY of CHICAGO, Chicago, Ill., researches and reports on "Radiochemical," (P.R. 199171), $29,526.

UNIVERSITY of MICHIGAN, Ann Arbor, Mich., research and reports on "Traumatic Effects of Rotating Dental Instruments," (P.R. 301538), $31,500.

UNIVERSITY of MINNESOTA, Minneapolis 14, Minn., research and reports on "A Study of the Effects of Hypoxia Upon Temperature Control During Exposure to High Environmental Temperatures, Fever, and Shock," (P.R. 301548), $41,932.

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

BABCOCK AND WILCOX CO., New York, catapult cylinder forgings, 112 ea., $174,509.

ECLIPSE-PIONEER DIVISION, Bendix Aviation Corp., Teterboro, N. J., amplifiers, junction boxes, controllers, indicators, etc., 7,117 ea., $3,189,341.

MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis, conduct research, etc., and deliver complete meteorological observing system for shipboard use, 2 ea., $120,541.

THOS. J. MORAN'S SONS, INC., New Orleans, enlarger, spare parts, etc., 1, $44,780.

RCA VICTOR DIVISION, Radio Corp. of America, Camden, N. J., Electrofax enlarger and spare parts, 1 ea., $68,372.

FOSTER D. SNELL, INC., New York, anti-icing and de-icing compound, 65 gal., $25,000.

VECTRON, INC., Waltham, Mass., turn and bank indicators and spare parts, 618 ea., $106,403.

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

Allis-Chalmers Mfg. Co., Terre Haute, Ind., acquisition of facilities, $52,000.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., transmitter, rate of flow fuel, synchro, 3,099 units, $833,720.

Bill Jack Scientific Instrument Co., Solana Beach, Calif., master control, intervalometer, C-2, 5 ea., amplifier assy., 5 ea., amplifier assy., 30 ea., $126,358.

Marathon Electric Manufacturing Corp., Wausau, Wis., cable assys., 42 sets, $48,235.

Motorola, Inc., Chicago, pulse generator, 173 ea., $292,497.

Henry Pratt Co., Chicago, temperature control valve system, $57,629; valves—ramjet, addition to engine test facility, $198,346.

Bendix Products Division, Bendix Aviation Corp., South Bend 20, Ind., brake assy.,

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(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

Remember the old National Guard air operations? The leather-helmeted guys who barged around the sky in outmoded, open cockpit, Air Corps crates . . . the Sunday aeronauts who more or less played at military flying for the hell of it . . .

Remember the beat-up, fabric-covered O-38 biplanes and the O-47s? The summer encampments in tents . . . the derring-do hops to 15,000 feet to photograph the field . . . the battered old hangars . . . the practice reconnaissance runs along local rail lines . . . the radio training with ticking code messages . . .

In those days the Guard fliers were regarded as a somewhat raunchy outfit of individuals who cloaked themselves in the glamour of flight with relaxed indifference—seat-of-the-pants pilots who perhaps talked better than they flew, but flying, nevertheless, because they loved it.

All outward resemblance to the old outfits has long since vanished, but three factors have remained unchanged over the years: the Guardsmen are still citizen soldiers, so to speak; they fly because they love flying; and they have an esprit de corps that cannot be topped.

Today the Air National Guard is a vital and vigorous link in the nation's defense, ready to move into full combat status in just the time it takes to gather squadron members from the many varied paths of life they walk during the week—four hours or less.

Not having followed the Guard too closely since the war, I was pleasantly surprised when I recently covered an encampment of the 146th Fighter Bomber Wing at Boise, Idaho.

This representative ANG wing, I found, was flying F-86A Sabre Jets in an operation that looked for all the world like a regular Air Force wing.

But then, why shouldn't it? The Guard is now getting the planes and equipment denied it so long during the helter-skelter years. It's commanded from the top down by men who know their jobs from the ground up. Many a World War II combat veteran and a good number of Korea jet aces, too, are in the cockpits—along with an increasing number of sharp youngsters who have gone to flight school from the enlisted ranks and returned as pilot officers.

Training for these weekend warriors is intensive in all phases and they must meet standards of skill and efficiency in navigation, night flying, gunnery, etc., that would shock the old timers right out of their puttees. Airmen, too, must meet equivalent standards for their jobs—and really work at it.

Most welcome is the morale that somehow is engendered in the Guard. Squadron competition is especially hot. Every man knows he can help make his wing outstanding by pitching in to make his squadron tops. In fact he'll tell you there's no better squadron in the business. And furthermore he'll prove it to you!

It's a pleasure, too, to visit an Air Guard base and see the new buildings, the huge, new hangars, the operations offices and the pilot ready rooms that are springing up as the Guard assumes its rightful place in the American defense scheme.

You think back to the old days, the ramshackle wooden structures, the cluttered greasy shops, and you marvel at the change.

Pointing up the Guard's important role today are the alert detachments that operate under the Air Defense Command on regular intercept duty. These units around the nation's perimeter are active duty segments of USAF air divisions charged with protecting our borders against air attack.

The Guard detachments are on alert from an hour before dawn to an hour after dusk (being equipped with day fighters without radar) and they fly with hot guns to check out any aircraft that requires checking.

A real outfit, the Air Guard, a hard-hitting, permanent backstop.

500 ea., 334 ea., 270 ea., $1,904,946.

Convair Division, General Dynamics Corp., Ft. Worth, Texas, facilities for production of B-58 aircraft, $2,700,000.

Cosmos Industries, Inc., 31-28 Queens Blvd., Long Island City, N. Y., pulse generator, spare parts data, 830 ea., $159,499.

Georgia Division, Lockheed Aircraft Corp., Marietta, Ga., utilization of heavy press program, $190,310.

Marquardt Aircraft Co., Van Nuys, Calif., aircraft power supplies, 8 ea., $64,222.

Glenn L. Martin Co., Baltimore, Md., mobile training unit, 1 ea., $196,582.

Convair Division of General Dynamics Corp., Fort Worth, Texas, facilities for the production of aircraft subassemblies, $30,000.

Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, Long Island, N. Y., Lens cone for camera, 30 ea., 2 ea., $685,662.

Lockheed Aircraft Corp., Marietta, Ga., facilities for the modification of aircraft, $100,000.

Ross Carrier Division, Clark Equipment Co., 250 Miller Rd., Benton Harbor, Mich., straddle carrier, 22 ea., spare parts manual, 22 kits, $413,992.

Royal Electric, Inc., South Limestone St., Jamestown, Ohio, mountings, 1,886 ea., 697 ea., $76,450.

Sperry Gyroscope Co., The Sperry Corp., Great Neck, L. I., N. Y., comp. of radio beacon, 660 ea., $6,515,910.

United States Gauge Division, American Machine & Metals, Inc., Sellersville, Pa., indicator, fuel flow, 949 ea., $34,081.

Wright Aeronautical Division, Curtiss-Wright Corp., Wood-Ridge, N. J., maintenance tools for engines, training equipment, $725,000.

Hydro-Aire, Inc., 3000 Winona Ave., Burbank, Calif., valve: drain fuel, 826 ea., $41,366.

McDonnell Aircraft Corp., P. O. Box 516, St. Louis 3, Mo., parts: maintenance, F2H aircraft, $70,622.

Niles-Bement-Pond Co., Chandler Evans Division 1 Charter Oak Blvd., West Hartford, Conn., parts for support of J57-P-7 engines, $44,652.

Pesco Products division Borg-Warner Corp., 24700 N. Miles Rd., Bedford, Ohio, spare parts to support motors for use on TV-2 aircraft, $40,113.

The Sherwin Williams Co., 101 Prospect Ave., Cleveland 1, Ohio, semi-gloss enamel, 27,700 gal., $46,948.

Surface Combustion Corp., Janitrol Aircraft-Automotive Division, 400 Dublin Ave., Columbus 16, Ohio, heater, lead assys. and maintenance parts for heater assys., $28,-256.

O. E. Szekely and Associates, Inc., 5312 Westminster Ave., Philadelphia 31, Pa., adapter for P5M-1 and P5M-2 aircraft, 43 ea., $48,476.

Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio, maintenance parts for various pumps, $35,793.

Allison Div., General Motors Corp., Indianapolis, T56-A-1 turbo-prop engine, 288 ea., T56-A-1 training engine, 8 ea., $36,-304,800.

Bell and Howell, Chicago, gun camera, PR 161576, 3 ea., $26,459.

Boeing Airplane Co., Wichita, implementation of production of B-52 airplanes, PR PA 222271, $10,000,000.

Cochran Foil Co., Louisville, Ky., chaff type RR 44/AL PRS 301975, 201231, 26,000 ctn., $270,285.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicator, fuel, type A-19, 2,011 ea., indicator, fuel, type A-16, 33 ea., $59,851.

Federal Telecommunications Labs, International Telegraph & Telephone Co., Nutley, N. J., facilities for performance of contract, PR 304254, $50,000.

General Electric Co., Schenectady, N. Y., generators, contr. panels, PR PE 228902, 60 ea., $124,809.

General Mills, Minneapolis, overhaul, repair and modification of Y-4 bombsights, PR 437154, $1,162,500.

Gremce Inc., Ft. Worth, electric generator, 76 sets, $82,342.

Lockheed Aircraft Corp., Marietta, Ga., facilities for production of C-130 and modi-

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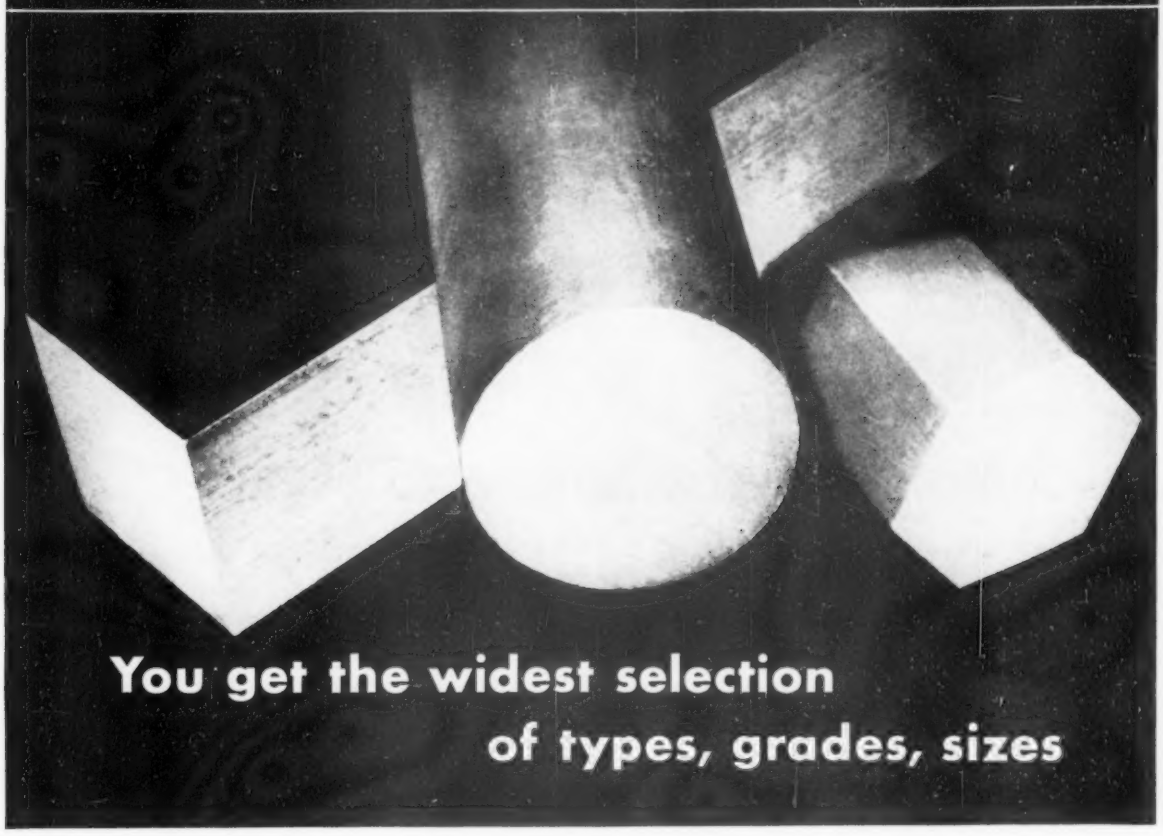

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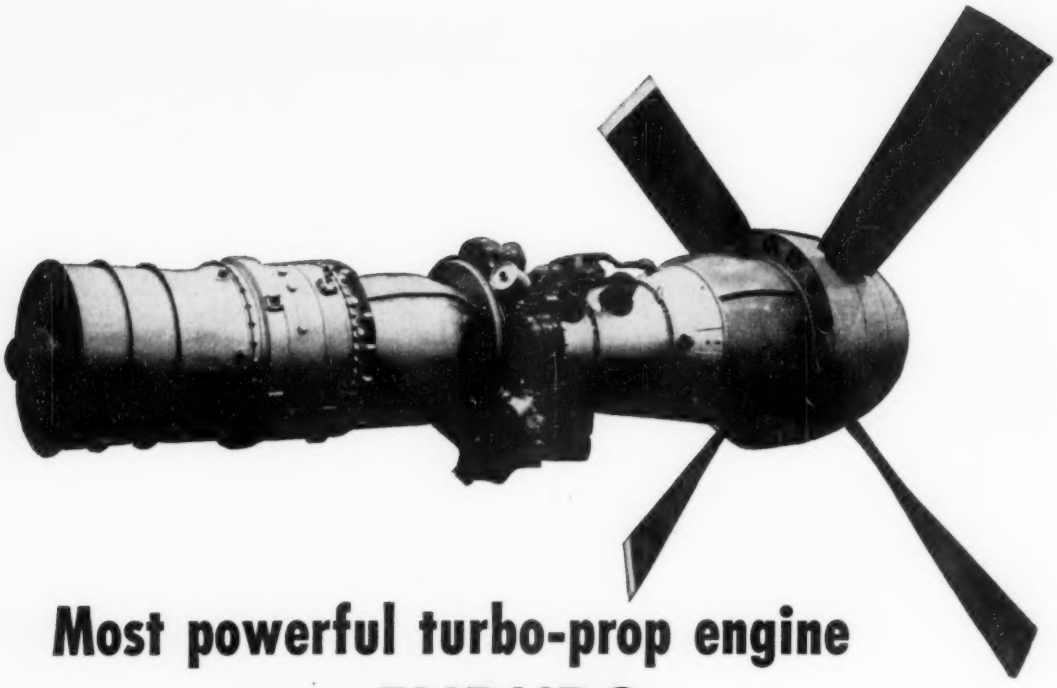

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THIRD, its resistance to corrosion under some of the toughest conditions.

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fication of B-47 aircraft, PRS 1940 59-194048, $847,000.

Glenn L. Martin Co., Baltimore, squadron equip., spares and tools, 3 sets, $5,087,099.

S. Morgan Smith Co., York, Pa., valves for ramjet, $27,250.

Motorola, Inc., Chicago, overhaul, repair and modify APS-23 radar sets, PR 437159, $1,070,000.

Sperry Gyro. Co., div. of Sperry Corp., Great Neck, L. I., N. Y., radar set AN/APN-59, 100 ea., PR 158611, $996,124.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Air Associates Inc., Teterboro, N. J., actuators, $65,836.

Bakelite Co., 30 East 42nd St., New York, resin, 30,000 lb., $31,200.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., pump assemblies for R7V-1 and WV-2&3 aircraft, 392 ea., $770,127.

Cannon Electric Co., 3209 Humboldt St., Los Angeles 31, plugs for general maintenance and overhaul, $25,955.

Crosby Chemicals, Inc., P. O. Box 111, Picayune, Miss., turpentine, 43,000 gal., $31,880.

General Electric Co., 1405 Locust St., Philadelphia, generator, tachometer, 1,125 ea., $27,131.

Great Lakes Mfg. Corp., 1046 E. 134th St., Cleveland 10, water pump assy., 380 ea., $65,892.

Walter Kidde & Co., Inc., 675 Main St., Belleville, N. J., cylinder, lifeboat inflation, 3,198 ea., $89,224.

New West Paint & Chemical Co., 1150 Revere Ave., San Francisco 24, resin, 19,450 gal., $37,356.

Permaflux Corp., 4900 West Grand Ave., Chicago 39, earphone cushion, 32,626 pr., $49,265.

Ruland Mfg. Co., 380 Pleasant St., Watertown 72, Mass., air, high pressure valve, 30,224 ea., $58,635.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., spare parts for various engines, $584,785.

Simmonds Aerocessories, Inc., 105 White Plains Road, Tarrytown, N. Y., tanks, $25,138.

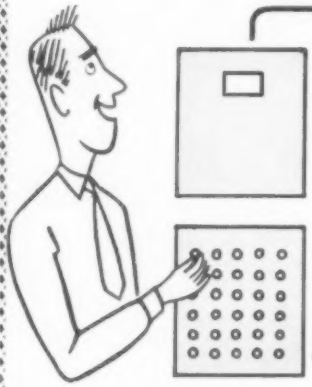
Martin Steam-Cleans Bombers On Line

B-57 bombers on Glenn L. Martin Co.'s production line are being steam-cleaned, with a resultant large saving in manhours.

After a partial wipe-down with a solvent, the plane's surfaces are steam-cleaned, then given an application of Alodine. Minimum difficulty is now encountered in producing a break-free Alodine film, Martin claims. Possibility of paint failures is greatly reduced because dirt is freely flushed from rivet heads and seams.

Under the old method, tar deposits, crayon marks and inspection seals were wiped off with a solvent. This was followed with an application of Butyl Cellusolve to the smaller surface areas with a brush, Martin says. Although the solution was flushed off with water and rag-wiped dry, working conditions were disagreeable, chances of paint failure increased, and it became difficult to produce a break-free Alodine film, the company reports.

WHY SHOULD I USE T-E'S SELF-BALANCING INDICATOR?



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Full scale travel only 4 seconds. Balances rapidly at temperature value.

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1/20 of 1% of scale range.

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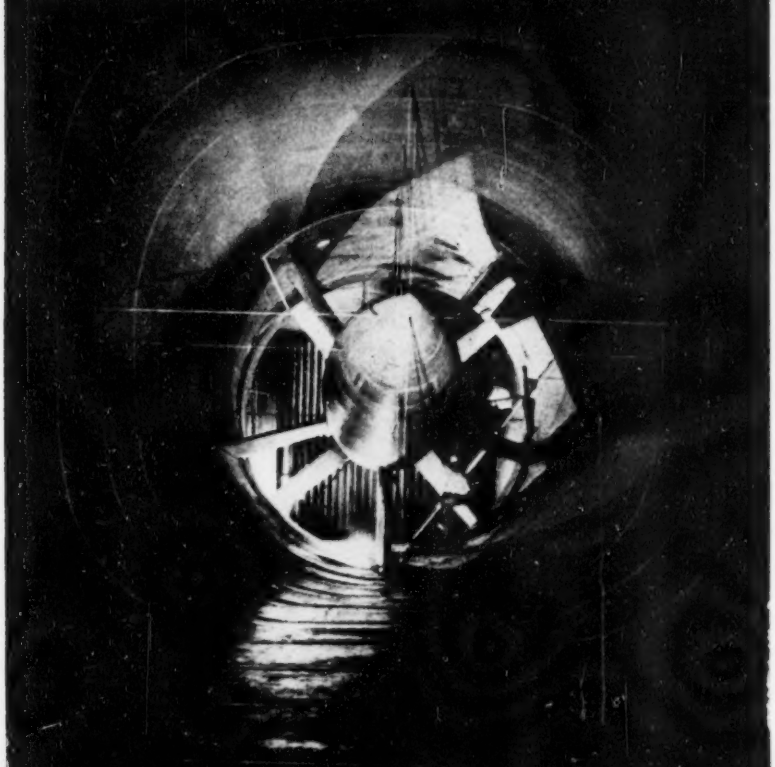
How Much *Lift* In A Bootstrap?



In the competitive technical air-world of today, the answer is simply, "not enough." Ambition and ability are still key success factors but they must be implemented with the "tools of the trade" . . . wind tunnels, electronic computing devices, physical test and research laboratories. These modern facilities are necessary to probe all fields of airplane, helicopter, missile and propulsion development.

At McDonnell Aircraft, our new wind tunnel—largest in the Mid west—is just one part of a $20 million facilities program to provide engineers and technicians with unlimited opportunities for professional growth-*advancement*.

For engineers with the basic requirements—ambition and ability—whose present horizons are restricted by routine assignments . . . we welcome the opportunity to discuss our advancement program.

Currently needed are:

Aerodynamicists
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OVERSEAS SPOTLIGHT

Rolls Makes India Study

NEW DELHI

Three British Rolls-Royce experts have submitted a report here on the possibility of setting up an aeronautical engine factory in South India. Several other European firms have been contacted for plans and estimates, but it is understood that the Rolls report is the only one the government is considering.

The new plant would form a wing of the Hindustan Aircraft factory at Bangalore, in Mysore State.

Copters to Span Water Gap

COPENHAGEN

Helicopter traffic between Cophenhagen, Denmark, and Malmoe, Sweden, will be opened June 1, 1955. Landing sites already are being prepared in downtown Cophenhagen and at Malmoe's railway ferry station. The 18-mi. hop over the sound is scheduled for 15 min. and will cost about $5.

Plans for a similar service between Elsinore, Denmark, and Helsingborg, Sweden, are not materializing for 1955, although a test service will be operated on the route during the International Architectural Exhibition in Helsingborg next summer.

Barrels to Fly Faster

STOCKHOLM

The Swedish air force has ordered modernization of an undisclosed number of its J-29 Flying Barrel jet fighters. The new version, to be known as the J-29F, will have a Swedish-developed afterburner to boost the thrust of its Swedish-built Ghost jet engine (AVIATION WEEK Oct. 4, p. 7).

Designed by the Swedish Air Board and developed in cooperation with the Svenska Flygmotor Co., the afterburner is said to be the first successful device of its type developed for the British-designed Ghost engine.

Plane Spare Parts Tax-Free

MANILA

Spare parts to be used in the repair of aircraft registered in the Philippines are exempt from the government's 17% exchange tax. Foreign exchange used for aviation insurance and charter fees for Philippines-registered aircraft is also exempt.

Tax exemption on cost, transportation or other charges incident to import of spare parts will apply when Civil Aeronautics Administration of the

"Gunner to Pilot . . . two fighters . . . turning in!"

No time to repeat this message. He must get every word right the first time.

In today's higher-speed, higher-altitude bombers, crewmen must quickly grasp every code-word passed. Speed of intercommunication has to keep pace with speed of operation.

Working since 1947, RCA engineers have developed the AN/AIC-10—an intercom system which meets Air Force requirements for high intelligibility under conditions of extreme noise and altitude. RCA noise-discriminating microphones have two faces which "balance out" extraneous noises, transmit sounds *only* from the speaker's mouth. Unique filter, amplifier and automatic volume control circuits reduce the effect of extraneous noise. Altitude-compensating headsets maintain sea-level sensitivity at 40,000 feet or more—and give crews maximum head comfort.

Now in full production, the AN/AIC-10 is but one of many complete electronic systems RCA has developed for the Armed Forces. RCA engineering —from original planning to final production—assures greater efficiency, effectiveness and safety in operation.

300,000 Spotters Wanted. Men, women volunteers for Ground Observer Corps to help the Air Forces search for hostile aircraft, man Air Defense filter centers, do many Air Defense team jobs. 200,000 patriotic Americans are now serving. Contact your local Air Force Office.

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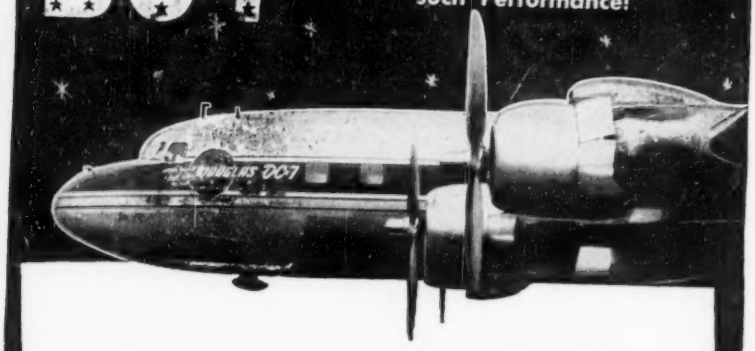
CAMDEN, N.J.

DC-7 NEVER BEFORE

such Magnificence . . . such Power

such Performance!



and NEVER BEFORE has the

A. W. HAYDON COMPANY *been so proud of its contribution...*

In the never-ending conquest of the vast barriers of space and time, Douglas goes ever forward meeting every challenge that men and machines must face. The newest — and brightest — star in the aviation firmament, the Douglas DC-7, is truly a miracle of the mastery of men over machines . . . and in this great work sixteen A. W. Haydon timing devices play an important part.

We at A. W. Haydon take pride in our contribution toward bringing a mass of metal and machinery into integrated performance which meets Douglas' high standards. Integrated performance is born of a multitude of small component parts, working in perfect mechanical and electrical coordination. The A. W. Haydon precision timing instruments are a vital part of this vast network.

DOUGLAS

DOUGLAS DC-7, the ultimate in comfortable and safe air travel. Swift, luxurious, dependable — the new DOUGLAS DC-7 justly deserves the accolades it is receiving.

- ✓ A. W. Haydon Time Delay Relay is a very important component of the automatic prop feathering system.
- ✓ A. W. Haydon Time Delay Relay times duration of prop feathering.
- ✓ A. W. Haydon Repeat Cycle Timer is a vital part of the prop deicing equipment.
- ✓ A. W. Haydon D.C. Timing Motors are used in the cabin pressurization systems.

when timing poses a problem — consult

(Catalog sent on request)

The A. W. HAYDON COMPANY

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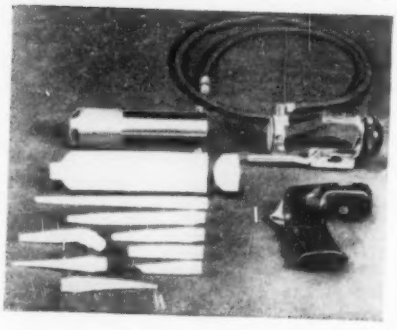
Design and Manufacture of Electro-Mechanical Timing Devices

Philippines certifies that the parts are essential to maintenance of covered aircraft.

Pastushin to the Islands

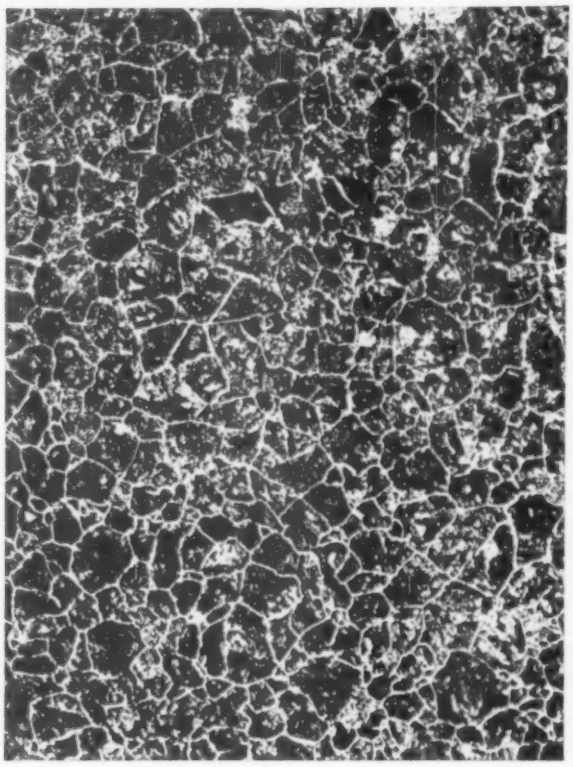
Pastushin Aviation Corp., Los Angeles, has gained permission of the Hawaii Aeronautics Commission to set up a subsidiary at Honolulu International Airport.

The subsidiary, to be known as Hawaiian Airmotive, Ltd., will be equipped to repair, maintain and modify commercial aircraft engines and parts that previously had to be sent to the West Coast. Victor Pastushin, the company's president, said the firm may employ as many as 200 people. Initial investment will be $100,000.



Smooth Sealing Ahead

Lightweight sealant gun developed at Douglas Aircraft uses disposable polyethylene plastic cartridges, plungers and nozzles. The nozzles are available in a wide variety of shapes, as the lower photo indicates. In addition, shapes may be changed by application of heat, and aperture may be enlarged by slicing off end. The tool is said to permit operator to work much more effectively in close quarters. Empty weight of gun is 17 oz., but it holds 30% more sealant than conventional designs weighing twice as much, Douglas says. Responsible for development of the tool were A. J. Detrie and P. J. Staybolt of the company's materials and process dept. Manufacturing and sales rights have been assigned to Semco Research Co., 212 W. Florence Ave., Inglewood, Calif.



Meet two of the reasons why TIMKEN® forging steels give you uniform, high-quality forgings

THE man on the left helps assure you of uniform composition in every Timken® steel forging bar. With this spectrometer, he can tell the exact composition of a melt in just 40 seconds. Results are flashed back to the furnace so the melter can maintain constant control of the heat analysis up to the instant of pouring.

The photomicrograph at right shows the uniform grain size of the Timken forging steels. Uniform grain size after heat treatment is assured by spectrometric or microscopic examination of every heat. The result—you can be sure that forgings made from Timken forging steels have uniformly high ductility and resistance to impact.

But that's only part of the story. You can hold rejects to a minimum because we condition the steel to fit your particular forging requirements. And you save steel because the good dimensional tolerances of Timken forging steels produce uniform weight multiples with a minimum of steel lost in flashings. You even have fewer furnace adjustments because Timken forging steels respond uniformly to heat treatment.

For help in improving the quality of your forgings and cutting production costs, write: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

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PRECISION!

The lift, the power, the drive . . . yes, the air-borne heart . . . of the YH-21 Piasecki "WORK-HORSE" Helicopter are delivered by the three transmissions shown here . . . the forward, mid and aft. For *this* kind of component fabrication, the best single manufacturing asset is the PRECISION for which *Steel Products* is famous!

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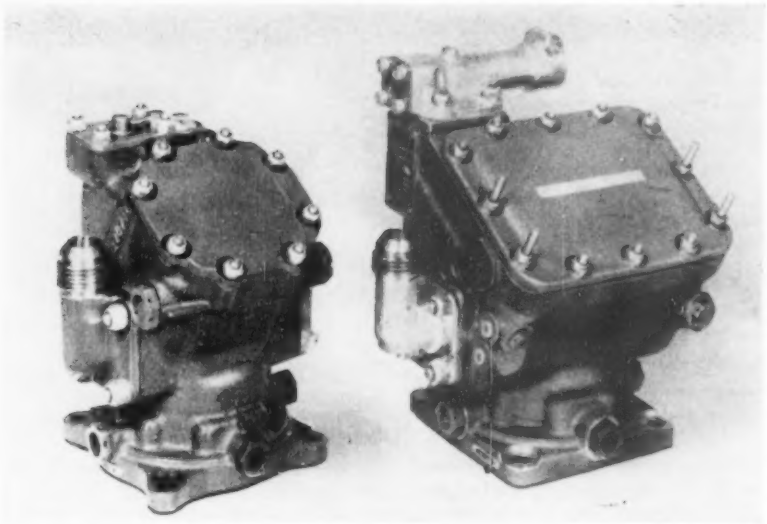

NEW VICKERS PUMP (l.) for DC-7 and 707 is up to one-third smaller than old type (r.).

Redesign Cuts Pump Weight, Size

By Erwin J. Bulban

Important savings in weight and size —two critical factors in the choice of aircraft equipment—characterize the new line of Vickers, Inc., variable-displacement pumps that are making their appearance initially on the new four-jet Boeing Stratoliner-Stratotanker (707) prototype and the Douglas DC-7.

The Boeing 707 jet uses four of these Vickers pumps in its utility system (landing gear, flaps and brakes). The DC-7 applies it to the cabin supercharger drive on production models, with retrofit installations being made on planes that came off the lines before the pump was available.

A thorough service testing on the Super Constellation is understood to be slated "soon" by Lockheed and an airline. The pump is also reported to be specified for a number of new military planes and several prototypes.

► **Evolutionary Design**—The new pump line is described by the company's engineers as an "evolutionary" progression of its predecessors, rather than a brand new design. But it is readily apparent that there are some ingenious improvements in the new design that make it much more than just another new improved model.

These changes are responsible for the pumps weighing up to 37% less and being as much as 33% smaller than the previous line.

The new Vickers units are designed for 3,000-psi. operation and are available in sizes having nominal deliveries from .60 to 23 gpm. at 1,500 rpm. The smaller models can be operated at 9,100 rpm. Basic operating temperature limits range from −65 to 160 F. Specially equipped models can be supplied to exceed these operational limits.

In test to military requirements, completed in July, the lightweight unit passed a 560-hr. trial at speeds from 750 to 4,500 rpm. and 3,000-psi. load, ending up in substantially "new unit" condition and showing no significant signs of wear, Vickers states.

Porting is optional and rotation can be either righthand or lefthand. Either uniflow (single direction of oil flow) or over-center (capable of reversing oil flow) capability is available. Cylinder controls can be provided to maintain selected pressure automatically while delivering varying flow, depending upon the system's requirements. An electric depressurizing control is available that will cause the pump to lock at minimum pressure and zero displacement while still leaving it prepared to meet system demands instantly.

Servo control arrangements are possible to allow control of hydraulic power in response to an electronic signal of a few milliamps. Or a simple control system can be furnished which will respond to hydraulic control pressures in a device supplied to the customer aside from the Vickers hydraulic components. The bulk of aircraft units being supplied are said to have the automatic pressure control.

► **Paring Weight, Size**—Redesign of the previous Vickers pump yoke is the basic area of improvement. A switch from aluminum to steel is a major feature of this change.

Previously the yoke was a U-shaped aluminum unit supported in the housing by a pair of pintles passing through its arms. It contained internal passages carrying oil from where it entered the pump to the valve plate and cylinder block (where pressure was developed) and then returned oil under pressure to the pressure outlet port.

The redesigned yoke is an alloy steel casting with integral pintles. This higher strength material permits making fluid passage walls thinner, cutting weight. Integrating pintles and yoke eliminates need for the inside yoke supports, cutting dimensions across the pintles. Since the inside yoke supports are eliminated, two bearings are also unnecessary. The new yoke has smoother passage for the oil and eliminates obstructions inherent in the previous design.

The smaller yoke and attendant elimination of separate pintles permits a smaller housing for the pump. Weight of the housing is further reduced by use of a magnesium-zirconium alloy having high strength and giving castings of great density. This density minimizes leakage problems.

Another weight saving was made in redesigning the inlet and outlet connections to embody aluminum castings having stainless steel threaded inserts. Military specs require steel for all threaded connections.

► **Operation**—The new pumps are of axial configuration having nine pistons. Piston stroke is determined by the angular relationship of the cylinder block and drive shaft axes. Angle is determined by position of the yoke, which in turn is set by the pump's control element.

Inertial force of rotating parts is minimized by the axial piston setup, obviating the need for large bearings. Yoke pintles are not subject to mechanical driving loads or hydraulic operating pressure. All working parts are continuously submerged in circulating oil.

Hydraulic oil enters the pump through a flange-mounted fitting at the yoke pintle. Passages in the yoke allow the fluid to flow to the valve plate which ports the oil into the cylinders where it is loaded to rated pressure and passed back to the system. Two types of valve plates are under consideration; the more common flat-type and the plug-type. Vickers says it does not know at this time if one type will be standard on the new pump series. Inlet and outlet passages in the pump are identical.

Two housings are available: one per-

mits yoke movement up to 30-deg. maximum on one side of center (uniflow type) and the other allows yoke movement to both sides of center (over center type). In zero position, the cylinder block's center line coincides with the driveshaft's center line. Although the pump may be turning, no oil will be delivered because the pistons are not reciprocating in the cylinder block. As the yoke turns away from center, oil delivery increases until full-flow position is attained.

Movement of the yoke from left to right of center reverses the oil flow. This change in flow takes place without special valving or complex mechanical devices that would affect parts rotation. Flow reversal can be made at rated speed and pressure or delivery can be cut to nothing while pressure is kept up at either port.

BEA Viscounts Turn To Synthetic Oil

British European Airways has switched over entirely to the synthetic Esso Turbo Oil 35 to lubricate the Rolls-Royce Dart turboprop engines in its Vickers Viscount aircraft, says Esso Export Corp. Formerly, mineral oil was used.

The synthetic oil significantly reduces wear of the propeller reduction gear train, a critical item, and it keeps the engine much cleaner, Esso claims. The oil goes the whole engine run without change.

It is reported that Rolls-Royce will approve the use of the U. S. counterpart, Esso Aviation Turbo Oil 35, for Capital Airlines' Viscounts, eliminating the possibility of Capital having to import oil from Britain.

The Viscount which participated in the last 12,500-mile United Kingdom-to-New Zealand race used only one-half pint of the synthetic oil per engine for the entire trip, Esso says. BEA now operates the Darts 750 hours between overhauls without oil change. The 750-hour period will undoubtedly be extended, Esso says.

OFF THE LINE

First F-84F Thunderstreak cockpit procedure trainer has been delivered to the Air Training Command by Stanley Aviation Corp. for evaluation. The Buffalo, N. Y., firm soon will deliver a similar trainer for the Lockheed T-33A two-place jet trainer.

Brass and plush. Charles Butler, of the industrial design consultant firm, Butler-Zimmerman, has just completed laying out the interior design and color scheme for a DC-4 belonging to Generalissimo Chiang Kai-Shek, and now is working on the interior of a DC-3 for Cuba's

Airport Lifesaver

Portable Pneolator is used at Greater Pittsburgh Airport to administer oxygen for artificial respiration to victims of shock, heart attack, smoke exhaustion or any kind of asphyxia. The unit, shown being lifted into the airport fire department's ambulance, is carried on all emergency runs at the 1,600-acre field. It was developed by Mine Safety Appliances Co., Pittsburgh, Pa.

For long life under extreme conditions of shock, vibration, corrosion, humidity and temperature

Bendix W type

HEAVY-DUTY

ELECTRICAL CONNECTOR

Here is the electrical connector designed and built for maximum performance under rugged operating conditions.

Intended for use with jacketed cable and not requiring ground return through mating surfaces, this connector incorporates sealing gaskets at all mating joints.

W-Type Bendix* Connectors also incorporate standard Scinflex resilient inserts in established AN contact arrangements. Shell components are thick-sectioned high-grade aluminum for maximum strength. All aluminum surfaces are grey anodized for protection against corrosion.

It will pay you to remember that for the really tough jobs, where ordinary electrical connectors just won't do, be sure to specify the W-Type Connector. Our sales Department will gladly furnish complete specifications and details on request.

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To the Employee Relations Director of every American company

LET'S FACE IT . . . the threat of war and the atom bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, may strike without warning.

The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.

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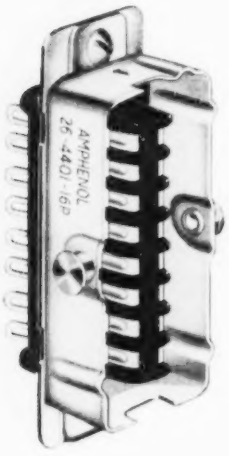
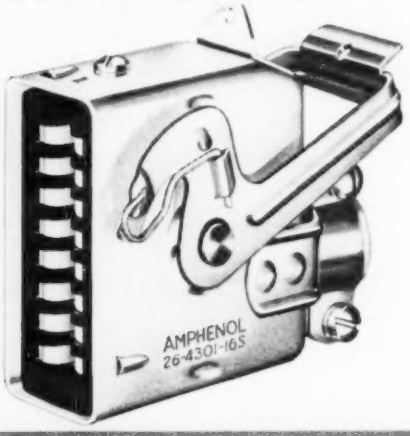
AMPHENOL

BLUE RIBBON CONNECTORS





now available with

Panel & Latch-Lock shells!

AMPHENOL's crack engineering team have completely redesigned the famous *Blue* RIBBON connectors and the results will be of interest to every company engaged in electronics.

The basic improvement has been the design of a new method of polarization. Instead of conventional guide pin and bushing polarization, male and female *Blue* RIBBON connectors are now mated by means of proper matching of the barrier heights betwen the contacts. Following this first important improvement AMPHENOL's engineers designed a complete line of front panel shells and cable-clamp latch-lock cans to fit the connectors—a step forward that makes the versatile *Blue* RIBBONs even more useful to the electronics industry.

What are the advantages of these design changes to you? Barrier polarization allows increased contact spacing without extending the overall length of the connector—mismating is impossible. Front panel shells and latch-lock cans are available for *Blue* RIBBONs in a wide variety of keying arrangements, making possible the mounting of large numbers of connectors side by side without the possibility of connector mismating by untrained personnel. Latch-lock types may be safety-wired and the cans are available with either end or side cable outlets.

Complete details on all AMPHENOL *Blue RIBBON connectors in* CATALOG R1

AMPHENOL

AMERICAN PHENOLIC CORPORATION *chicago 50, illinois*

In Canada: AMPHENOL CANADA LIMITED, Toronto

President, Fulgencio Batista. Conversion of both planes will be handled by Pan American at Brownsville, Tex.

Lockheed Aircraft Corp. engineers have devised a time-saving, easy-to-service Super Connie leading edge inspection panel and improved de-icer boots which will allow disassembly of wing or empennage structures without need to peel back the boots. This should save an appreciable number of man-hours each time the operation is performed.

Clary Multiplier Corp's Aviation Div. will act as manufacturer's agent in the aircraft industry for Avron Corp., Long Beach, Calif. Clary will handle domestic and export sales of Avron's line of aircraft valves and assemblies for hydraulic, fuel and pneumatic applications. Clary's address: San Gabriel, Calif.

WHAT'S NEW

Telling the Market

"Answers to Red Hot Problems" is 8-page brochure of technical data, charts and photos about **ceramic coatings for high-temperature use.** Write California Metal Enameling Co., 6904 E. Slauson Ave., Los Angeles 22, Calif. . . . Standard Pressed Steel Co., Box 566, Jenkintown, Pa., has issued a 32-page catalog, called Unbrako Standards, describing in pictures and text the company's line of **precision threaded fasteners.** . . . Despatch Oven Co. describes its **paint spray booth line** in 8-page Bulletin 66. Address is 619 8th St. S. E., Minneapolis.

Niagara Machine & Tool Works has recently issued two bulletins describing its products. No. 66 introduces the company's **straight-side, single-action, eccentric-geared presses** (series SE-1, 2,4); Bulletin 74-B tells about Niagara's **folders and brakes.** Write to 683 Northland Ave., Buffalo, N. Y. . . . **Air data components and systems for aircraft and guided missiles** are described in 26-page booklet put out by AiResearch Manufacturing Co., Los Angeles 45, Calif. . . . Turco Products, Inc., has put out a 12-page booklet telling how its **dye penetrants,** Dy-Chek and Chek-Spek, help spot hidden flaws in metal parts. Address: 6135 South Central Ave., Los Angeles 1, Calif.

Airmark Plastics Corp. is distributing reprints of Boeing Document D-12608 and Military Specification MIL-P-7788, which together describe specs and problems associated with

DOUGLAS RB-66

Today's aircraft...

tomorrow's, too

DOUGLAS A4D

CONVAIR XFY-1

are WESTERN GEARed

Virtually every military or commercial aircraft in the air today has one or more Western Gear units aboard to make the pilot's job easier and to insure successful flight. And on Western Gear design boards are plans and specifications for gear drives for tomorrow's aircraft, for flight that is projected three, five . . . even ten years from now.

Western Gear has designed and manufactured every type of aircraft mechanical power transmission equipment – actuators, accessory drives, complete control systems and dozens of other applications – for every type of flight, piston engine or jet, guided missile or rocket.

There's a vast store of experience crowded in the 66 years since Western Gear first opened its doors for business in San Francisco. It's always available at no obligation to help you solve your mechanical power transmission problem, backed by the facilities of six plants located throughout the West. Write today for information. Address Executive Offices, P.O. Box 182, Lynwood, California.

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THOS. J. BANNAN, *President*

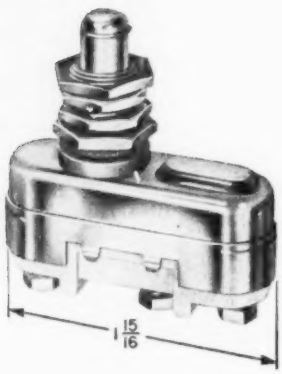
PLANTS AT LYNWOOD, PASADENA, BELMONT, SAN FRANCISCO (CALIF.), SEATTLE AND HOUSTON — REPRESENTATIVES IN PRINCIPAL CITIES

MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

WHAT do you want in an Aircraft switch?

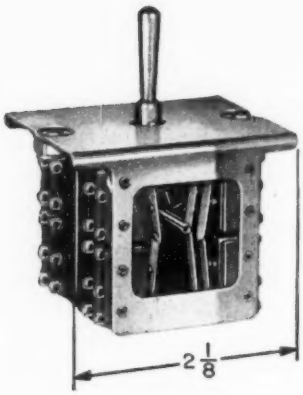
- Resistance to high temperature?
- Multiple circuit control?
- Sealing against environmental changes?
- Small size—with high electrical capacity?
- Switches for exposed locations?

Let a MICRO SWITCH engineer help



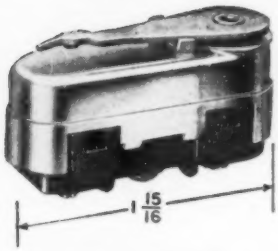
Resistance to high temperature?

Today's jet engines produce extreme heat. Two of these MICRO SWITCH high temperature switches are located within a few inches of the 700° C temperature of the after burner on Chance Vought's Navy Cutlass F7U-3. Mounted at the rear lower end of the J-46 jet engine, they signal the opening and closing of the after burner eyelids. This high temperature switch is an important MICRO SWITCH contribution to aircraft design. Whatever your switch requirement it will pay you to check first with MICRO SWITCH.



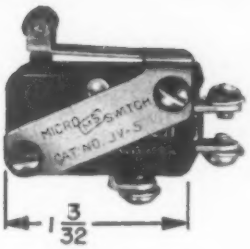
Multiple circuit control?

Efficient, lightweight and compact, this MICRO SWITCH toggle switch provides accurate multiple circuit control in Republic Aviation's F-84F Thunderstreak jet fighter. An assembly of 16 SPDT subminiature switches, operated by a single bat handle, gives control of as many as 32 circuits. This is one of hundreds of MICRO SWITCH toggle switches developed to meet the exacting requirements of aircraft engineers. For the switch to do a big job in a small space—consult with MICRO SWITCH.



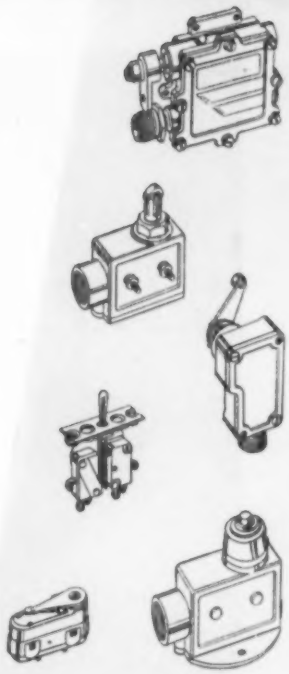
Sealing against environmental changes?

MICRO SWITCH not only provides an extremely wide range of hermetically sealed switches but the MICRO SWITCH sealing process gives a true glass to metal and metal to metal seal. Perfect operation of these truly hermetically sealed MICRO SWITCH precision switches is assured under all environmental conditions. For long life and trouble-free operation be sure that the hermetically sealed switch is a MICRO SWITCH product.



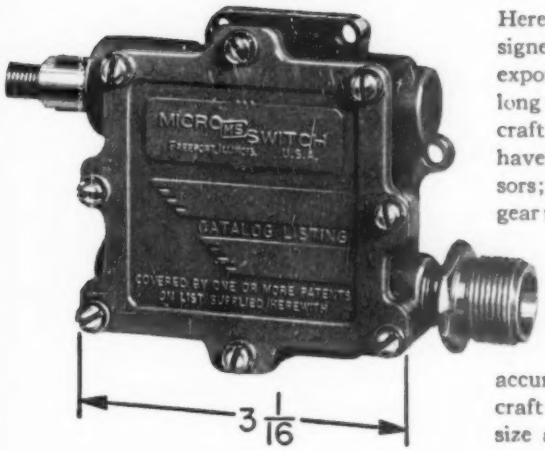
Small size with high electrical capacity?

This MICRO SWITCH V3 switch has the highest electrical capacity of any switch of its size. Bell Aircraft engineers selected it as safety and warning switches on their HSL-1 tandem rotor helicopter. These switches are ideal for use as limit, control or safety switches in applications where space is limited. Engineering assistance is available at the nearest MICRO SWITCH branch office. It will cost you nothing—can save you time and money.

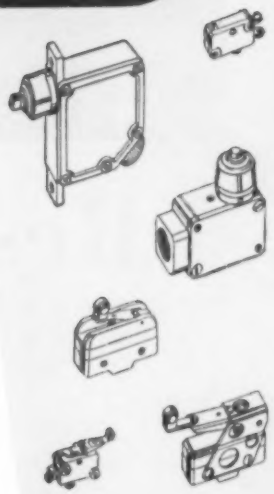


you select the right precision switch

Switches for exposed locations?



Here's a sealed switch assembly designed by MICRO SWITCH for use in exposed locations. This switch has long been a popular favorite with aircraft designers. Commercial airliners have it on the main landing gear scissors; Navy fighters use it as a landing gear uplock to signal when landing gear is retracted and locked. MICRO SWITCH engineers "grew up" with the aircraft industry. This is but one of hundreds of switches designed to supply the accurate reliability demanded of aircraft switches combined with small size and light weight. New switches are always being developed at MICRO SWITCH. What is *your* precision switch requirement?



A complete line of precision snap-action switches for aircraft

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

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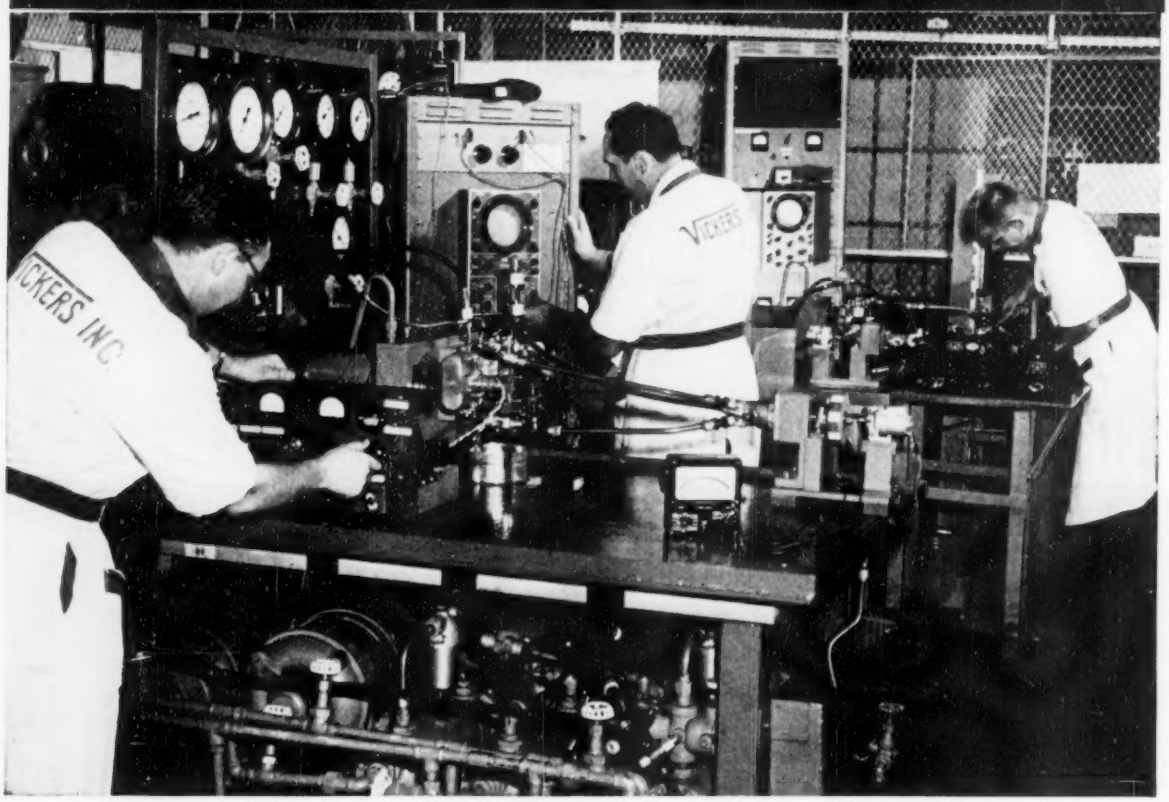

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These are fundamental developments that have been of vital importance in the progress of hydraulics. They are representative of a large line of equipment that, with Vickers experienced application, assures you the best in any type of hydraulic operation. Vickers, with unmatched laboratory and basic research facilities, continues to lead the way in the oil hydraulics industry.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

engineering and design of edge-lighted panels. Write to 5524 Vineland Ave., North Hollywood, Calif. . . . Catalog recently issued by Pioneer Aluminum Supply Co. lists various **aircraft extrusions** (and their prices) carried by Pioneer, a distributor for Reynolds Metals Co. For your copy, write 5251 W. Imperial Highway, Los Angeles 45.

Alloy Casting Institute, technical association of high alloy foundries has published set of 13 data sheets describing most popular **Cast Corrosion-Resistant Stainless Steel Alloy Grades.** Address: 32 Third Ave., Mineola, N. Y. . . . Bulletin 460 on **"Dag" Colloidal Dispersions** gives various basic dispersions and applications. Catalog is available from Acheson Colloids Co., Port Huron, Mich. . . . Harvey Aluminum has issued 36-page **Comprehensive Study of Aluminum Extrusions.** Available on request on business letterhead; additional copies are $1.50 each. Address: 19200 S. Western Ave., Torrance, Calif. . . . **Facts About Zirconium** is pocket-sized booklet giving historical and technical details about the metal and its compounds. Write to Carborundum Co., Niagara Falls, N. Y.

Publications Received

• **Component Design, Handbook of Aeronautics No. 2,** General Editor, C. G. Burge —Pub. by Pitman Publishing Corp., 2 West 45th St., New York 36, N. Y. $7.50; 207 pp. Second in the series of volumes comprising a new edition of Handbook of Aeronautics. The new edition has been radically transformed to meet the present-day requirements of the industry.

• **Industrial Voyage,** by P. W. Litchfield, Illustrations by Richard Bartlett. Pub. by Doubleday & Co., Inc., 575 Madison Ave., New York 22, N. Y. $4.50; 347 pp. Autobiography of an American businessman, chairman of the board of the Goodyear Tire & Rubber Co., told against the background of the industry he helped to create.

• **The Light Metals Handbook,** by George A. Pagonis. Pub. by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. $8.50; 199 pp. of text; 185 pp. of tables. Facts and information on aluminum- and magnesium-base alloys.

• **The Dynamics and Thermodynamics of Compressible Fluid Flow, Volume II,** by Ascher H. Shapiro. Pub. by Ronald Press Co., 15 East 26th St., New York 10, N. Y. $16.00 per volume; two-volume set is priced at $30.00; 600 pp. 580 illustrations. Volume II presents, in a concise and unified style, a comprehensive treatment of compressible fluid mechanics.

• **The New Warfare,** by C. N. Barclay. Pub. by Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. $2.75; 64 pp. The author discusses and develops the theme that the existing conditions in world affairs amount to war—not a full-scale shooting contest—but the modern substitute of propaganda, underground activities, armed threats and war by proxy.

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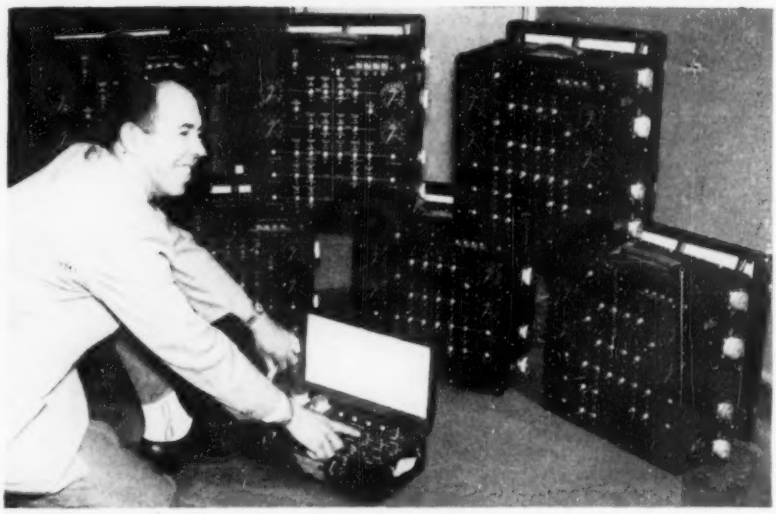

SMALLER PANEL (foreground) replaces seven bulkier units used in fueling B-47s.

B-47 Refueling Panel Replaces 7

Boeing Airplane Co. is saving the Air Force and the taxpayer an estimated $2.25 million with a new panel for controlling single-point refueling of B-47 Stratojets.

The job of ground service personnel at AF bases will also be eased considerably since the new universal panel can be used on any model of the B-47, regardless of which of several fuel systems are to be handled.

Boeing-Wichita engineers faced this problem: Five different B-47 production models built thus far incorporate three different fueling systems and there were four additional proposed changes due. Thus far, each fueling system required that AF tanker trucks carry a separate panel to control the single-point "gassing up" for every type. With the new changes coming up, this meant that a total of seven different panels would have to be available.

Aside from the stocking problem, the fact that each of the old devices cost $2,100 made it obvious that a new, universal panel that could handle any B-47 would provide real savings. The panel designed by Boeing-Wichita costs only $211 plus $300 for modifying the airplane to accommodate it—a total of $511. In addition, it is possible to take out 16 lb. of electrical equipment from each bomber. The new universal panel is also much more compact than older models (see photo above).

Robert Hinkley, a service engineer at Boeing-Wichita is credited with developing the universal ground service refueling panel. Production models are being built in quantity for the company by the Associated Co., Inc., Wichita.

Thermal Switch Tester Works on the Plane

On-the-plane functional tests of thermal switches, separately or with their fire-detection or anti-icing systems, cylinder head thermocouples and their circuits, can be made using the portable Tempcal Tester.

The Tempcal heater probes generate and apply heat of a predetermined degree to the thermal switch or thermocouple by means of a voltage regulator, the specified temperature being read on a potentiometer. It takes about eight minutes to reach 800F temperature.

Accuracy to ±5F is guaranteed on temperatures from 0 to 800F. The heater probes used for cylinder head thermocouples are guaranteed accurate to ±4C at 0 to 300C operating temperatures.

B & H Instrument Co., Inc., Ft. Worth, Tex.

Precision Mandrels Are Hand-Lapped

Guaranteed accuracy and concentricity within .002-in. total indicator reading is claimed for new line of expanding mandrels, designated Type S Counter-Centric made by Le Count Tool Works.

Vital components of the mandrels are hand-lapped for high accuracy. They

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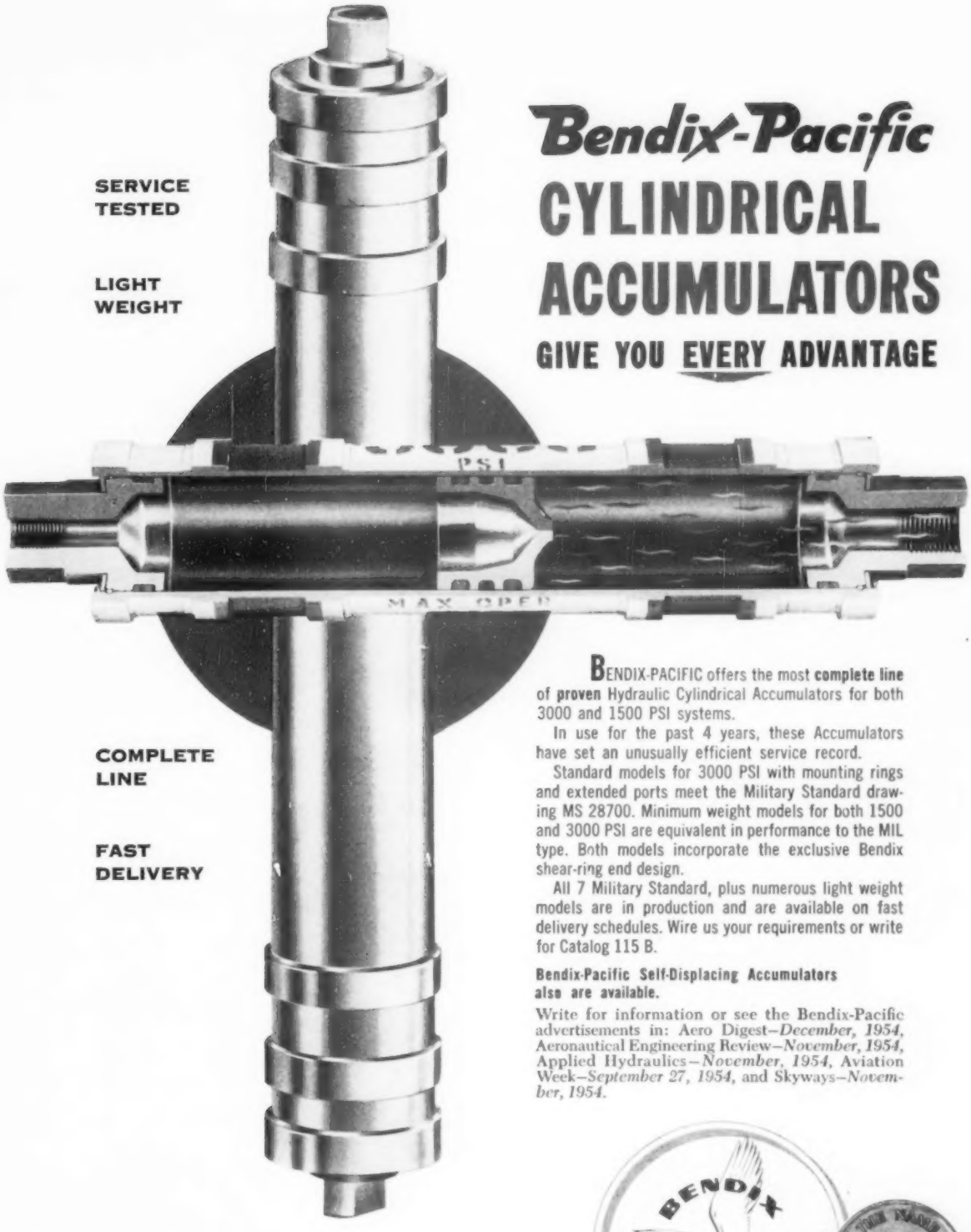

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In use for the past 4 years, these Accumulators have set an unusually efficient service record.

Standard models for 3000 PSI with mounting rings and extended ports meet the Military Standard drawing MS 28700. Minimum weight models for both 1500 and 3000 PSI are equivalent in performance to the MIL type. Both models incorporate the exclusive Bendix shear-ring end design.

All 7 Military Standard, plus numerous light weight models are in production and are available on fast delivery schedules. Wire us your requirements or write for Catalog 115 B.

Bendix-Pacific Self-Displacing Accumulators also are available.

Write for information or see the Bendix-Pacific advertisements in: Aero Digest—*December, 1954*, Aeronautical Engineering Review—*November, 1954*, Applied Hydraulics—*November, 1954*, Aviation Week—*September 27, 1954*, and Skyways—*November, 1954*.

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There is no one "cure all" for system instability. The desired stability of a servo loop is attained through the proper selection of components that satisfy the various conditions under which the loop will operate. Kearfott offers four basic motors and combinations for providing system stability. All feature high speed of response; low inertia and high stall torque.

SYSTEM STABILITY

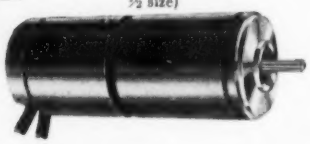
SERVO MOTORS: Servo motors with high torque to inertia characteristics possessing (built-in) inherent damping ranging in size from ¾" to 1¾" diameter are available. Low speed, low power motors for use in simple instrument servos where high damping and/or low time constant is required can also be provided.

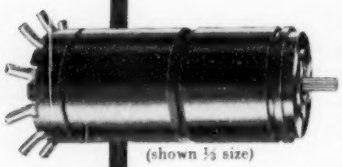
VISCOUS DAMPED SERVO MOTORS: Provide integral viscous damping for simple instrument servos. Any degree of damping can be provided. These units reduce no load speed of standard motors to 50% or 75% of normal, providing 70% or 50% of critical damping respectively.

(shown ⅔ size)

(shown ¾ size)

(shown approximately ½ size)





(shown ⅓ size)

INERTIAL DAMPED MOTORS: Integral inertially damped motors for use in high speed and/or high gain servo systems—damping on acceleration or deceleration basis with little loss in normal no load speed. These units make possible system cut off frequencies up to 25 cps using magnetic amplifiers.

SERVO MOTOR TACHOMETER GENERATORS: For system stabilization by voltage feedback from an integral tachometer generator. May be obtained as damping generators for use in simple rate servos or as rate damping generators for use in very high gain systems. The latter feature high linearity, high output and maximum output to fundamental null ratios.

These servo motors are suitable for most exacting requirements. Write today for descriptive bulletin giving data of components of interest to you.

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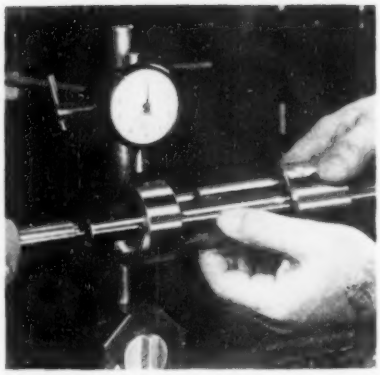


PRECISION FINISH features new mandrel.

are available for 11 tools for all size arbors from ⅜-in. through seven inches.

Le Count Tool Works, 390 Capitol Ave., Hartford, Conn.

Master Gage Block Set Measures .000001 In.

A set of 82 gage blocks, said to be accurate within plus or minus one-millionth of an inch and which will not accept oxidation, corrosion or microscopic films, is being made available by Webber Gage Co.

Blocks are made of tough, fine-grained chrome carbide and are checked at a constant temperature of 68 deg. against master blocks, which in turn are regularly tested by a Zeiss Opton interferometer using the wavelength of light as its standard of measurement.

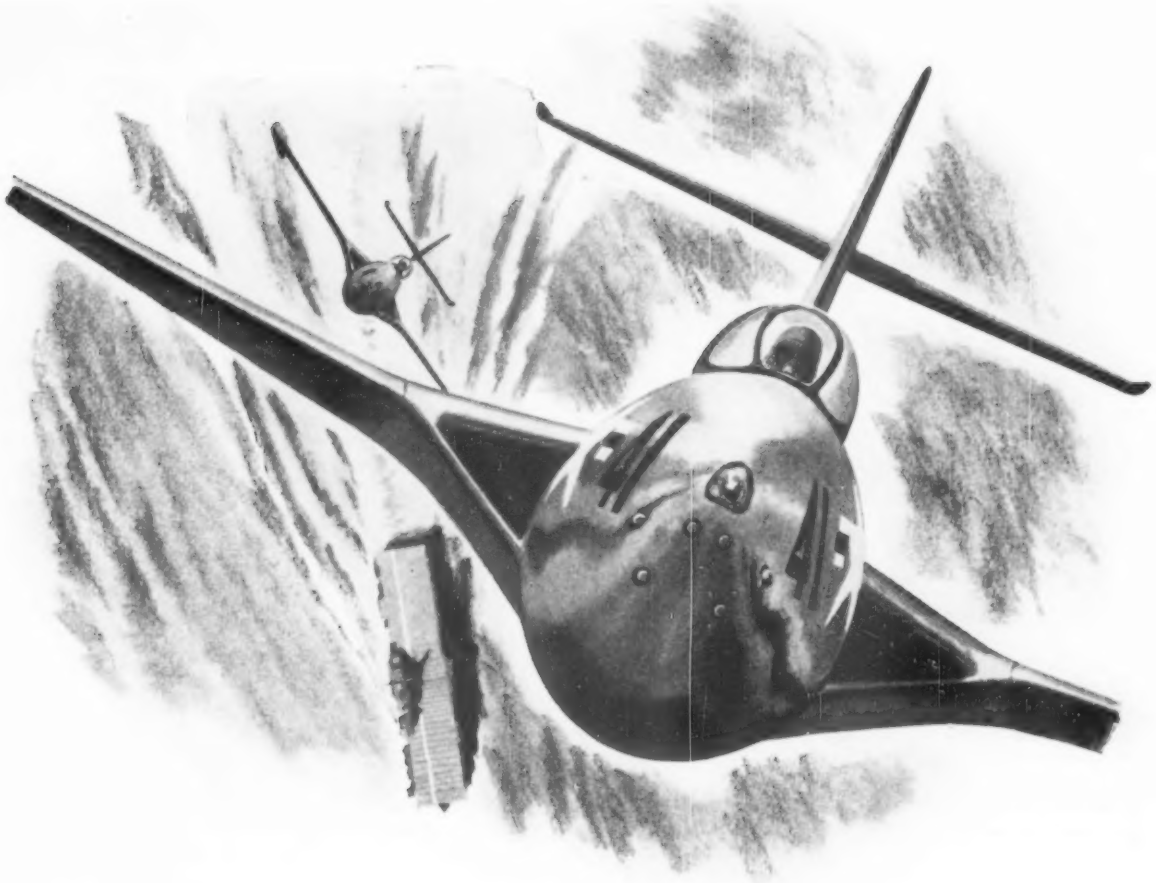
Webber Gage Co., 1220 Huron Road, Cleveland, Ohio.

New Airborne Generator Meets Severe Requirements

A new, lightweight, high-altitude generator, capable of operating at unusually high air-in temperatures, has been developed by Jack & Heintz. The generator is a 40-kva. 3-phase 400-cycle unit. It will power radar, radio, instruments, and other avionic equipment.

Main new feature of the machine is a fan-shrouded cooling unit incorporating a water separator which allows the generator to handle up to 3 lb. of water per min. entrained in generator cooling air. J&H says the new generator takes out "sufficient air moisture to insure the electrical stability of the generating system." The unit dissipates internal heat by means of blast air directed at internal heat sources. J&H say this results in a generator brush life more than double that specified by the military.

Other details: weight—86 lb.; diameter—10¼ in.; overall length—16 in.; output—208/120 v. at 6,000 rpm. with a power factor of 0.75.



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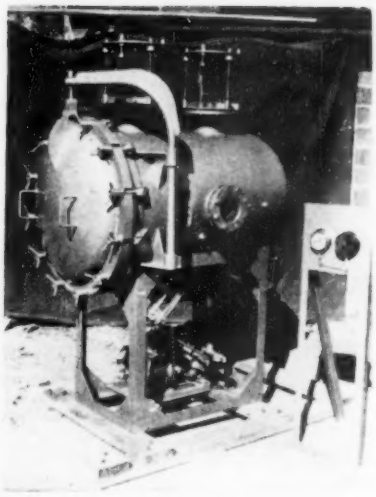
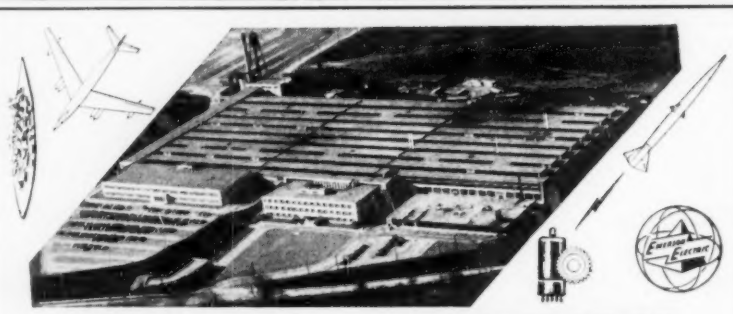


Rugged Chamber Tests High Octane Gasoline

If you have the need to explode high octane aviation gas at any simulated altitude from sea level to 50,000 ft., there is an improved test chamber available from American Research Corp., which features two pressure relief valves either of which is more than ample for venting the explosion.

Designed to meet USAF specification MIL-E-5272A, the device is operated on a 115-v. power circuit from a remote control station. Equipment includes terminal pads, a sightport, altitude and temperature indicators and an air mover for uniform dispersal of the gas. Size is 3x3 ft.

American Research Corp., 11 Brook St., Bristol, Conn.



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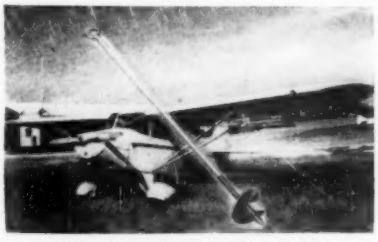


Lightplane Leash

Keep-Stake earth anchors are designed for tying down smaller planes in unpaved areas. They weigh 1¼ lb., and consist of a 30-in.-long steel rod 7/16 in. in diameter, with a 3-in. anchoring screw plate and a 1-in. solid screw eye. To install, a small pipe is placed in the eye to serve as a cross handle and then the anchor is screwed into the ground. It can be unscrewed in a similar manner. The 30-in. anchor has a holding force of 750 to 1,000 lb. When a paved surface is applied above the Keep-Stakes, their holding capacity is multiplied. List price is $1.69. H. B. Chance Co., 210 North Allen St., Centralia, Mo.

New flexible mount for P&WA's T-34 engine

This Model 5100 MB mount will support and isolate Pratt and Whitney T-34 turboprop engines in the Boeing YC-97J Stratocruiser and the Lockheed C-121F Super Constellation. MB mount components are also used in the Douglas C-124B. Design, development and testing of the new unit were made the sole and full responsibility of MB's vibration engineers. Engine and airplane manufacturers thereby reaped the full benefit of MB's specialized skills in this field.

Four of these Series 5100 Mounts are used per engine to isolate vibration. They're produced with the emphasis on performance and dependability in service – features for which MB Mounts have been justly famous for over 15 years.

Here is one more case showing the confidence that major manufacturers in commercial and military aircraft have in MB's ability to take over the full vibration control project and deliver results.

the MB manufacturing company, inc.

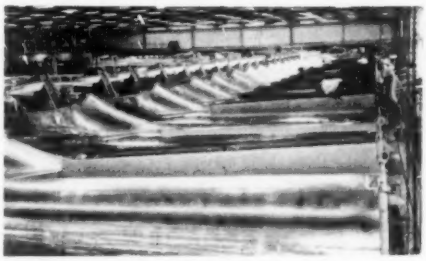
1060 State Street, New Haven, Conn.

HEADQUARTERS FOR PRODUCTS TO *ISOLATE* VIBRATION...TO *EXCITE* IT...TO *MEASURE* IT

How TEMCO helps Boeing build B-47's

Thousands of man-hours of TEMCO's production skill are incorporated into the famous Boeing Stratojets performing so sensationally around the globe today. For over three years, TEMCO has been delivering aft fuselage sections to Boeing, Wichita. Proud to be associated with such an outstanding aircraft builder, TEMCO believes that such cooperation within the industry is a big factor in the Nation's defense potential.

Boeing is but one of the industry leaders relying upon TEMCO to help simplify production. Current contracts also include fabrication of major components for Convair, Lockheed, McDonnell, and Republic. TEMCO earned these contracts because of its established reputation for delivering a quality product, on schedule, at one of the lowest costs in the industry.



Rear fuselage sections for the B-47 Stratojet have been rolling from TEMCO's assembly lines since 1950. On the overhead conveyor assembly line shown above, final equipment items are installed in the components.

TEMCO
AIRCRAFT CORPORATION
DALLAS, TEXAS

Tiger Employes Rally to Save Cargo Line

- **Workers agree to take 5% wage cuts to return FTL to airfreight business as individual operation.**
- **Prescott forecasts 'tough months ahead,' despite assurances that shippers will stick with airline.**

By William J. Coughlin

Burbank, Calif.—Flying Tiger Line last week wound up 18 months of negotiations with Slick Airways, the government and labor unions by returning to its former status—an independent airfreight line.

The much-discussed merger with Slick was off; a proposed equipment-leasing operation was off—and, company officials said ruefully, revenue was off.

▶ **5% Wage Cuts**—Decision to remain in the airfreight business followed the declaration by Tiger employes that they were ready to take wage cuts if necessary to keep the nation's pioneer all-cargo airline operating.

A number of shippers also urged FTL to remain in the air cargo business to keep it competitive, the company reported.

At a meeting with employes, FTL president Robert W. Prescott put the problem simply: Outgo must be brought within income. This, he said could be done in two ways at once—by increased efficiency and by wage adjustments.

Flying Tiger now will file exhibits with CAB by Dec. 10, supporting its application for renewal of its airfreight certificate and seeking additional authority to transport mail and express.

The airline also expects to file a petition to participate in the surface mail-by-air case, seeking authority to participate in the Post Office experiment. Slick already has petitioned to intervene.

Pilots, office personnel and maintenance crews agreed to wage cuts that may average out at about 5%. Tiger officers then talked to some of their shippers. The shippers would stick with them.

▶ **Reasonable Chance**—After a meeting of the board of directors, Prescott issued this statement: "We will continue independent operation of our airfreight contract and charter and maintenance services.

"We believe that the sum total of the savings which employes have indicated they would be willing to effect will be sufficient to give the company a reasonable chance of success in the tough months ahead of us."

The merger with Slick had been called off when the two companies found it impossible to reach a satisfactory solution to labor problems involved in the merger. FTL said a later proposal that would have converted the company into an equipment-leasing firm while Slick remained in the airfreight business, also was stymied by labor provisions imposed by Civil Aeronautics Board (AVIATION WEEK Oct. 25, p. 100).

▶ **Quick Breakup**—Unmerging, the two companies discovered, goes a lot faster than merging. Separate flights began last week.

"It's a lot simpler to break up than it is to get together," commented one Tiger official.

There still were a great many problems to be solved, however.

The two airfreight lines already had merged their terminal facilities across the nation. Now Tigers was out looking for new space in such cities as Chicago, Detroit, and Boston, while Slick sought new facilities in San Francisco, Oakland, Cleveland, Newark, Hartford and Philadelphia.

At the Burbank headquarters, Slick officers moved out of FTL headquarters and back to their old building.

Fortunately, the accounting departments of the two airlines had continued to operate independently while awaiting final settlement of the merger. Thus, the financial separation was not as complicated as it might have been.

Even so, there still were some decisions to make. Tiger freight occasionally had moved on Slick airplanes and Slick cargo had flown on Tiger transports. Customers of one line sometimes had been billed on the other's letterhead. Such funds probably would be divided by some rule-of-thumb, a company spokesman indicated.

▶ **Staggered Scale?**—Whether the wage adjustment for FTL employes would be on a staggered scale or 5% across the board had not yet been determined, a Tiger executive said. In fact, even the 5% figure still was indeterminate, based on the belief that an overall 5% reduction in expenses was necessary to keep the company in the black.

What might happen was this: Executive salaries might be cut more than 5%, low salaries not at all and intermediate salaries 5%—for a 5% average.

▶ **Streamlined Operations**—FTL also set

Defense Secretary Inspects Boeing 707

Secretary of Defense Charles E. Wilson, in the pilot's seat of Boeing Airplane Co.'s 707 jet transport prototype, receives a briefing from Boeing president William M. Allen (left). In the righthand seat is Air Force Undersecretary James H. Douglas. Tag dangling from the roof between the seats is a warning that the aircraft is not to be taxied or flown until the tag is removed by the preflight inspection supervisor. Boeing has received a substantial USAF order for improved Model 717 versions of the 707, designated KC-135 (Aviation Week Oct. 18, p. 14).

about streamlining its management setup—combining, for example, such departments as ground operations and sales. There were some layoffs of mechanics but a spokesman said this was due to expiration of an Air Force contract.

A new charter operation has been organized.

Flying Tiger, with 36 freight and contract aircraft, thus prepared to concentrate its full attention once again on U. S. airfreight Route No. 100, linking 44 cities from coast to coast.

When a newsman asked jokingly what would be done with such souvenirs of the merger as the knotted rope used in the ceremonies some months ago to link a Tiger and a Slick aircraft together as a symbol of the merger, an FTL spokesman replied wryly: "Perhaps we'll put them in a glass case in the hall where we'll be able to see them if we are ever tempted to merge again."

Strike Mediator Critical of AA

Neutral report blames American's handling of 8-hr. rule; spanks both sides for obstinacy in settling dispute.

Much of the ill will that culminated in the American Airlines' pilot strike was caused by the company's "loose handling" of the dispute prior to the time it became a strike issue, according to David L. Cole, the mutually selected neutral.

In the full text of his interim report, Cole criticises AA for petitioning Civil Aeronautics Board for waiver of the 8-hr. rule on transcontinental DC-7 flights without any prior discussion on the point with the pilots.

Cole says pilots believed this was a breach of their understanding with American, since it had been AA's practice to confer with the pilots on such matters. He notes that a misunderstanding resulted from statements made by the company's representative to the pilots' committee early in the dispute.

▶**Frozen, Unfriendly**—On the other hand, Cole criticizes both the pilots and AA for the "frozen and unfriendly attitudes" arising during the controversy. This "discouraged the parties from opening their minds sufficiently to offer or accept these assurances (that the 8-hr. rule would not spread to other flights) until it was too late to be of value.

"For the same reason, this obstinate and defiant spirit prevented the parties from coming to a sensible solution of the problem of realistic scheduling, a task which should be relatively easy when informed and intelligent people undertake it seriously.

"Likewise, the pilots rejected practically automatically the possibility that mechanical and technical improvements could be made which might make the deviation from the eight-hour rule negligible in character. It is not necessary to list all the items which would tend to accomplish this.

"If this proceeding succeeds in softening the antagonism which has been built up, it will be agreed that the extremes to which the parties went were needless, and unwise."

▶**Customary Method**—The neutral points out that "in keeping with the customary method of consultation over possible changes in working conditions," American's director of flight appeared Sept. 30, 1953, at a meeting of the Air Line Pilot Assn.'s master executive council to discuss problems of the nonstop DC-7 westbound flight.

"He outlined the plans to try to make this aircraft meet its specifications and expressed the belief that after a reasonable trial and break-in period it would be able to do so," Cole says. "He stated that the company would not violate the law, and that if it was found that the westbound flight could not come within regulations it would be discontinued.

"The pilots understood him to say that if it could not be made within the prevailing 8-hr. flight limitation, it would be discontinued."

▶**Protests, Criticism**—Cole cites a bulletin from AA's director of flight to all DC-7 pilots and flight engineers on Mar. 5, "after the company had been operating the flights for more than three months and ALPA's protests and criticisms of the operation were becoming more insistent and emphatic." He quotes the following from this bulletin:

- "First of all, when I appeared before the M.E.C. to give this group the story of the company's DC-7 planning, I did not say 'the operation could be conducted within the flight time requirements.' Speaking for the company, I said:
- "American Airlines is a responsible company and has not nor does it intend to operate 'outside the law.'
- "Should it (AA) find that after a reasonable opportunity we could not operate nonstop within flight time limits, (it) would discontinue nonstop operations.
- "As of the present date, the company does not feel that it has had reasonable opportunity to demonstrate westbound nonstops in 8 hr. . . ."

The next thing the pilots knew, says Cole, American had filed a formal waiver petition with CAB. He notes that there is little now that can be done about this, other than to charge it up to "loose handling" on the part of the company, and suggests "that it was most unfortunate and that the parties earnestly assure each other that similar misunderstandings will be carefully guarded against in the future."

▶**Direct Impact**—In another section of his report Cole again is critical of AA, saying: "For some time rival airlines have avoided trying to outdo one another in terms of speed (advertising-wise), and the industry is satisfied that this has been beneficial. The schedules have a direct impact, also, on the working conditions of pilots. The hourly component of pilots' flying pay is based on scheduled or actual time, whichever is greater.

"The flight time limitations of the Civil Air Regulations, particularly the 8-hr. rule, are predicated on scheduled time. Obviously, then, scheduled block-to-block time is of real concern to the pilots, and the carrier must expect to be held to account for the validity of the schedules which it establishes.

"Indeed, the collective bargaining agreement in Section 9A3 explicitly gives the pilots the right to question scheduled time found in actual operation to be improper."

In line with the recommendations in Cole's report (AVIATION WEEK Nov. 1, p. 86), both American and ALPA currently are negotiating to iron out their basic differences. Cole had recommended that the nonstop schedules be continued subject to conditions and restrictions to be worked out between the principal parties.

JAL to Trade U.S. Pilots for Japanese

Japan Air Lines' Japanese pilots, up to now flying as co-pilots, soon will move into the captain's seat on domestic routes. The first three are slated to make the switch next month.

All JAL chief pilots now are Americans, mostly from Transocean Air Lines. Present plans call for Japanese captains on all planes by October 1957.

JAL officials say they expect to have the airline's entire domestic service captained by Japanese by November of next year. Replacement of the present staff of American pilots would save the company approximately $250,000 per year.

For overseas flights, JAL hopes to have Japanese captains as soon as possible. It plans to put five native co-pilots on the Honolulu run by the latter part of next year, promoting them to chief pilots by late 1956.

The company currently has 75 pilots.

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Nonsked Case

- **CAB counsel proposes switch to air charter.**
- **Says irregulars are a 'natural' for this field.**

Establishment of a new class of airlines, "certificated charter carriers," is proposed by Civil Aeronautics Board's Bureau of Air Operations in a brief filed with examiners in the irregular carrier case.

The two main points which were made by the bureau's counsel, Melvin Bagan:

• Individual ticketing of persons or property shipments by the nonskeds, seeking operating authority from the Board, should be banned. He said such service is not "additional and supplemental" but would parallel that performed by the presently certificated airlines, since to be economically feasible, it must be concentrated on high-density route segments where unlimited service on an individual sales basis already is authorized.

• The irregular, with low overhead costs and without the obligation to provide service over a fixed-route structure, is a "natural" to pioneer and develop new plane-load charter services, a field "which is practically virgin and with almost unlimited possibilities."

In domestic and overseas operations, Bagan said, the all-charter operators should be given a free hand to develop both passenger and freight traffic. But in foreign transportation, he recommended that their operations be limited to property shipments.

▶ **Removing Stigma**—Foreign passenger charter operations might divert substantial traffic from the presently certificated international airlines, increasing the subsidy requirement. It also would have a "disturbing effect" on bilateral air transport agreements.

Because international journeys are planned long in advance and their cost is high, Bagan contended, there would be a big inducement for individual passengers to band together on plane-load charter flights at cut rates.

Granting positive operating authority in the form of certificates (instead of exemptions), the BAO counsel maintained, would relieve all-charter operators of "any unfavorable connotation which may have become associated with the term 'irregular' and 'nonscheduled'."

▶ **Certificate Terms**—Bagan suggested two classes of all-charter certificates, authorizing: (1) interstate transportation of persons and property and (2) transportation of persons and property overseas and of property only in foreign transportation.

Other certificate terms he proposed:

• Duration should be for five years. This would give the airlines a sufficient trial period and permit the Board to review its policies in the light of developments, he said.

• There should be no limitations as to frequency and regularity.

"Since the charter carriers would be limited to plane-load group and property movements between points, they would continue to develop the charter potential rather than divert traffic from presently certificated carriers. The public benefits from an exclusive service would outweigh what little diversion, if any, that did occur."

• Airlines should not be limited to geographical areas.

"Success of the certificated charter carriers is dependent upon the flexibility in its scope of operations and ability to pioneer new areas and types of traffic," Bagan said.

"Any area or geographical limitation would tend to restrict the carriers' flexibility and could force them to operate a route-type service."

• Criteria for determining a bona fide charter operation should be explicitly spelled out. Assurances must be required that groups were in existence prior to the application for charter service and were not created simply to get reduced transport rates, he said. Charter carriers, the counsel added, should be barred from accepting traffic from agencies whose business is the formation of passenger groups from the general public or the sale of individual transportation services.

In awarding all-charter certificates, Bagan urged the Board to give "considerable weight" to evidence showing an applicant has carried out charter air carrier operations successfully in the past.

Since the temptation will be strong for charter operators to encroach on individual sale and route-type services, he recommended that nonskeds that have persisted in violations of CAB regulations in the past should be denied certificates.

Frontier Wins Raise

Civil Aeronautics Board has ordered a temporary mail rate increase for Frontier Airlines, yielding $59,881 additional pay annually.

The raise covers increased costs due to inauguration of new service by Frontier in the Williston Basin area of North Dakota.

The new rate will boost Frontier's mail pay to $2,935,391 for the year ending Sept. 15, 1955, compared with $2,875,510 under the former rate.

New Mail Pay Formula To Get Full Hearings

Full-fledged proceedings that could drag on for years will be required to establish new service mail rates for the 13 domestic trunk carriers, because of the strong opposition of United and Trans World Airlines to Civil Aeronautics Board's proposal to base rates on a multi-element formula (AVIATION WEEK Oct. 11, p. 13).

Both airlines have filed objections with CAB to the plan and to its use on a temporary basis without hearings.

Under the plan, airlines would be paid an in-transit haul rate of 30.10 cents a ton-mile plus 4.86 to 14.58 cents for each pound with higher fees. Higher fees paid for enplanings at small airports.

From the present 45 cents a ton-mile, United's yield under the proposal would drop to 38 cents and TWA's to 37.

Eastern Air Lines also has objected to the CAB proposal, despite the fact that its ton-mile yield would increase from 45 cents a ton mile to more than 47 cents. Eastern maintains that its rate for 1953 should be 58 cents and, because of rising costs, should be more than this in subsequent years.

United Bids for SWA Local Service Routes

Local service routes should be taken over by non-subsidized trunklines to eliminate the government support now required for their operations, James E. Moore, assistant to the president of United Air Lines, recommended at a CAB examiner's hearing on renewal of Southwest Airways' certificate.

"United has expressed its willingness to serve Southwest's route in order to give CAB the opportunity, if it so chooses, to solve the feederline subsidy problem along the lines recently recommended by the President's Air Coordinating Committee—by assigning the local service routes to various non-subsidized trunklines."

Claiming UAL would save the government more than $1 million annually now paid in subsidy to SWA, he added: "United feels that it is the obligation of the unsubsidized carriers to provide service along their routes to the smaller communities where the CAB determines the public convenience and necessity require scheduled air transportation."

United is concentrating its fight for service on four California points served by Southwest—Santa Barbara, Monterey, Eureka and Red Bluff. The Board suspended UAL service to these points in 1952, in favor of Southwest.

CAB ORDERS

(Oct. 7-14)

ORDERED:

Permission for Central Airlines to suspend service temporarily at Shawnee, Okla., and at Paris, Tex., on Segment 2, and to omit service at Enid or Ponca City, Okla., but not both, on flights in excess of two one-way trips per day over Segment 1.

Investigation of a special fare proposed by Pan American World Airways for travel on cargo aircraft from Fairbanks, Alaska, to Seattle, Wash.

Consolidation of application of Western Air Lines to add Sioux Falls, S. D., as an intermediate point on Route No. 35 with application by the City of Sioux Falls for that service. Leave to intervene in the proceeding was granted to South Dakota Aeronautics Commission, Braniff Airways, Pierre, S. D., and Huron chamber of commerce.

Resort Airlines permission to suspend service at Havana and Varadero, Cuba, Washington, D. C., and Nassau, Bahamas, for specified periods of time.

Cancelation of foreign air carrier permit issued to Peruvian International Airways.

GRANTED:

Permission for Flying Tiger Line to make a passenger charter flight from Lisbon, Portugal, to Baltimore, Md., carrying merchant seamen.

Permission for North Central Airlines to continue providing service between Grand Forks, N. D., and Minneapolis, Minn., via Thief River Falls, Bemidji and Brainerd, Minn.

DISMISSED:

Application by Central Airlines for approval to purchase a DC-3 from F. Kirk Johnson, board chairman of the carrier.

Application of Trans-Caribbean Airways for reduced passenger-mile rates.

(Oct. 15-22)

ORDERED:

Exemption permitting Flying Tiger Line to provide free transportation from Miami, Fla., to Kingston, Jamaica, for Sir Hugh Foot, governor of Jamaica, to permit him to observe the manner in which migratory workers are transported.

Exemption permitting Piedmont Aviation to serve certain points in Kentucky and West Virginia.

Continuation of temporary suspension of service by Braniff Airways at Topeka, Kan.

GRANTED:

Permission for Jamestown, N. D., Jamestown chamber of commerce and the North Dakota Aeronautics Commission to intervene in the application of Northwest Airlines to suspend temporarily service at that city.

Permission for the state of South Dakota to intervene in the application of Northwest Airlines to suspend temporarily service at Aberdeen, S. D.

Permission for Montana Aeronautics Commission to intervene in application by Northwest Airlines to suspend temporarily service at Bozeman and Kalispell, Mont., and for Gallatin Field Board to intervene in the Bozeman portion.

Permission for Ozark Air Lines to file its brief in the Route 106 renewal case.

Renewal of authority for Mohawk Airlines to continue for one year certain change-in-service patterns.

DENIED:

Petition by Byerly Aviation to modify certificate authority to Ozark Air Lines.

DISMISSED:

Complaint by Northern Consolidated Airlines against cancelation of pickup and delivery charges proposed by Alaska Airlines.

Complaint by Northwest Airlines against a proposal by Pan American World Airways to operate combination aircoach-first-class aircraft.

Proposal by National Airlines on day coach fares.

SHORTLINES

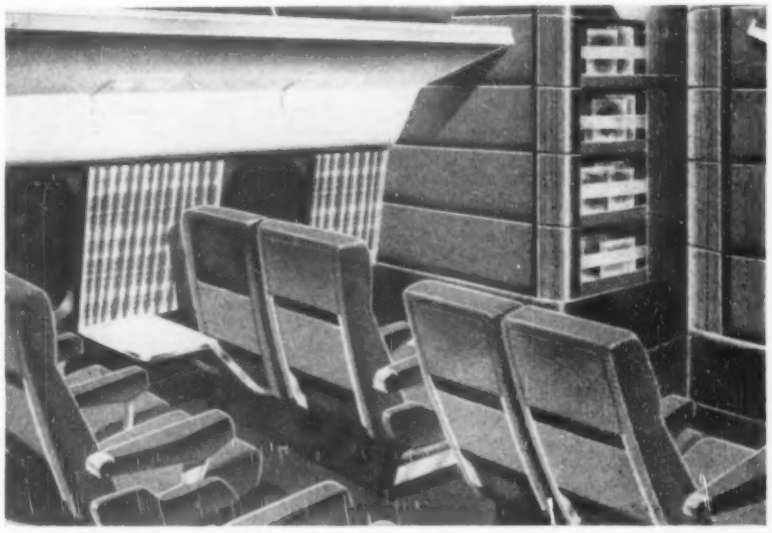
► **Pan American World Airways** has a new leased teletype circuit between Montevideo and Buenos Aires that ties into the international network at New York.

► **Scandinavian Airlines System** has announced a number of ski tours to various resorts in Europe. Trips run about three weeks and cost $625 to $1,484 all-inclusive. A transpolar tour is planned from Los Angeles in February.

► **Southern Airways** reports a new traffic record for September of 11,500 passengers flown 1,950,000 passenger-miles, an increase of 22% over September 1953. Passenger traffic for the first nine months of 1954 increased 12% over the same period of 1953.

► **Trans World Airlines** will carry 244 telephone company employes to Europe during October and November on a series of tours.

► **United Air Lines** is installing a new electro-mechanical device called Unitel to speed handling of passenger reservations. The equipment is designed to give instantaneous information on seat availability to sales agents. Initial installations will be made in New York, Chicago, Los Angeles and San Francisco.



First Look Inside Capital's Viscounts

Artist's conceptions of industrial designer Butler-Zimmerman's treatment of Capital Airlines' turboprop Vickers Viscount transport interior show passenger seats with tables that hinge out from seats ahead (left in top view). Other picture shows how carryon baggage will be stowed in multi-shelved compartment. CAP's Viscounts will have passenger loading door ahead of wings. Door will hinge forward; integral steps, probably power actuated, will provide cabin entry. Foreign Viscounts load passengers through door behind the wings, using a ramp. First three CAP transports will have TCA's decor, remaining 37 will follow CAP specs.

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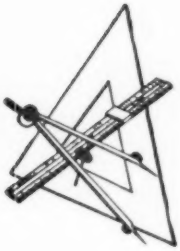

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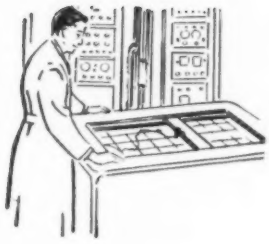

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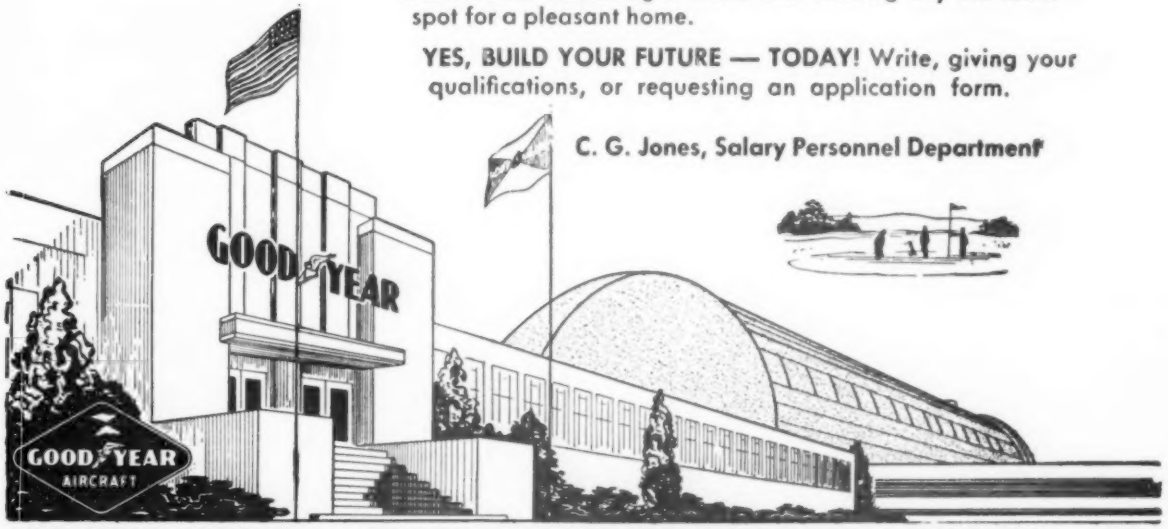

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Jim Heng, Aerodynamics Division head, discusses results of high speed wind tunnel research on drag of straight and delta wing plan forms with Richard Heppe, Aerodynamics Department head (standing), and Aerodynamicist Ronald Richmond (seated right).

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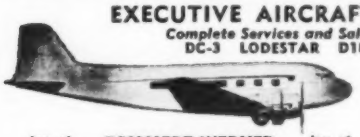

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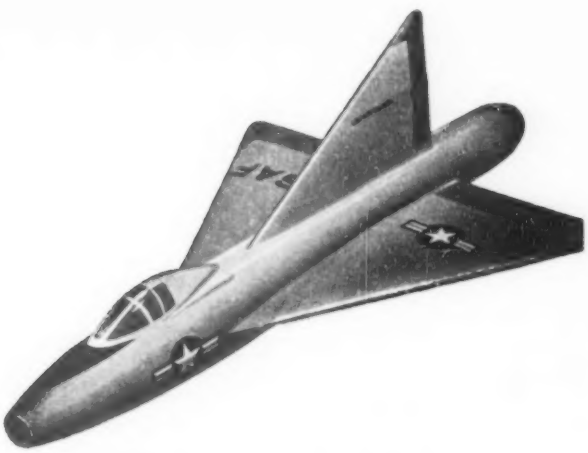

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News Sidelights

Experimental French Payen P.A. 49 delta single-seater is in the second stage of flight tests. Craft features landing brake system comprising a "mobile fin," part of which splits open to create drag.

Role of Ground Observer Corps volunteers in the U. S. air defense team is portrayed in a new 16-mm. color film, "Mrs. Jones, Meet Your Partners," produced and released by Northrop Aircraft, Inc., Hawthorne, Calif. Feature is a simulated interception and destruction of an attacking "enemy" bomber by a Northrop F-89D Scorpion all-weather jet fighter.

Prototype installation of 12 fuel bladders instead of four integral tanks is being made on Firestone Tire & Rubber Co. Lockheed Lodestar by Temco Aircraft Corp., Greenville, Tex. The cells are interconnected to form four fuel areas so that the existing fuel selector system can be retained.

In-flight experience on scheduled Slick services will be obtained by flight engineering students of Spartan School of Aeronautics as part of their qualification for Civil Aeronautics Administration certificates under an arrangement worked out by the scheduled freight airline and the Tulsa, Okla., school.

Lightplane fleet used for prospecting uranium continues to grow. Some 185 small aircraft are being used in the Colorado plateau area searching for radioactive ore.

Lanier Paraplane 2 has undergone Army tests at Davison Field, Ft. Belvoir, Va. The plane can fly as slow as 19 mph., take off and land in 100-ft. areas. Firm is building a flying mockup of a production-type Paraplane, expected to fly in a few months.

Boeing WB-50s will replace World War II WB-29s as the workhorse of USAF Air Weather Service beginning next May. B-50s will be modified by Air Materiel Command to take weather observing equipment. Newer planes have 850 mi. more range and higher cruise speeds. Crew members will have hot meals aloft, cooked on the B-50's electric oven.

'FLYINGEST PILOT' is what Northwest Airlines calls Capt. Walter R. Bullock, 55, pictured in a 1910 Curtiss Pusher replica that he built and flies as a hobby when he isn't piloting an NWA Boeing Stratocruiser across the Pacific. Credited with 25,000 hr. of scheduled flight plus 4,000 hr. private piloting, Bullock is believed to have more flying time to his credit than any other active commercial pilot, according to available records, NWA says. He learned to fly in 1916.

AVIATION CALENDAR

Nov. 9-12—Air Line Pilots Assn., convention, Sheraton Hotel, Chicago.

Nov. 10-12—Flight Safety Foundation, annual Air Safety Seminar, Bishops Lodge, Santa Fe, N. M.

Nov. 10-12—Industrial Management Society, 18th National Time and Motion Study and Management Clinic, Hotel Sherman, Chicago.

Nov. 11-12—Airmail Pioneers, division reunion, Hollywood Roosevelt Hotel, Los Angeles.

Nov. 12-13—National Symposium on Quality Control and Reliability in Electronics, Statler Hotel, New York.

Nov. 15-17—Aviation Distributors and Manufacturers Assn., 12th annual meeting, Mayflower Hotel, Washington, D. C.

Nov. 15-17—Magnesium Assn., 10th annual meeting, Hotel Chase, St. Louis.

Nov. 17—Clifford B. Harmon Trust, luncheon honoring Jacqueline Cochran and Maj. Charles E. Yeager (USAF), 1954 winners of the Harmon International Trophies, Hotel Statler, Washington, D. C.

Nov. 17-19—California Association of Airport Executives, semi-annual meeting, Sainte Claire Hotel, San Jose, Calif.

Nov. 18-19—American Society for Quality Control, ninth Midwest conference, Baker Hotel, Dallas.

Nov. 29-Dec. 3—American Society of Mecanical Engineers, Aviation Division, annual meeting, New York.

Nov. 30-Dec. 3—American Rocket Society, ninth annual meeting, Hotel McAlpin, New York.

Dec. 17—Wright Day Dinner, Statler Hotel, Washington, D. C.

Dec. 17—Institute of the Aeronautical Sciences, 18th Wright Brothers Lecture, U. S. Chamber of Commerce Building, Washington, D. C.; to be repeated Dec. 20 in Los Angeles and Dec. 22 in Cleveland. Lecturer: Bo Lundberg, director of the Aeronautical Research Institute of Sweden.

Jan. 19-23—World Trade Fair of Aviation, Miami International Airport, Miami, Fla.

Jan. 24-27—Plant Maintenance & Engineering Show and three-day conference, produced by Clapp & Poliak, International Amphitheatre, Chicago.

Jan. 24-28—Institute of the Aeronautical Sciences, 23rd annual meeting and Honors Night Dinner, Hotel Astor, New York.

Feb. 20-22—Institute of Surplus Dealers, trade show and convention, 212th AAA Armory, New York.

Mar. 11—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Exposition and Congress, featuring aircraft light metals, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

Apr. 18-21—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Hotel Statler and McAlpin Hotel, New York.

Apr. 24-28—Airport Operators Council, 1955 convention, Olympic Hotel, Seattle.

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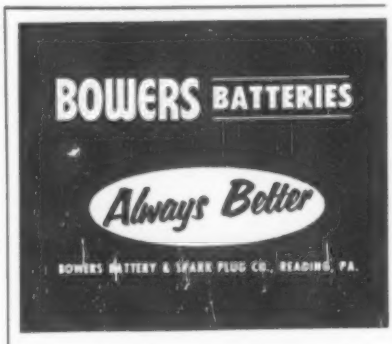

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EDITORIAL

Rails Must Not Retard Air

If the railroads cannot accommodate themselves to long-term economic trends and if government policies are deemed responsible to some extent, then the government should change those policies accordingly.

This is the recommendation of the scheduled air transport industry to President Eisenhower's Cabinet Committee on Transportation.

"The solution to the railroad problem is not to be found by seeking to arrest technological progress or by attempting to impede the public's use of other forms of transportation," the Air Transport Assn. statement asserts. "We recommend that the Cabinet committee direct its attention to the underlying causes and long-run transportation and economic trends that have brought about the railroad problem rather than to the symptoms of that problem that have usually been analyzed in past studies."

For years the railroads have insinuated that air transport has grown mainly because it was inordinately subsidized, to the disadvantage of the railroads which were thus incapable of competing fairly. The rails have ignored the demand for fast air transportation.

The ATA thus assumes—rightly, we believe—that the primary problems of transportation concern domestic surface transport, especially the railroads. It points out that the Air Coordinating Committee months ago completed a thorough study of U. S. civil air policy, which already has been accepted by the President as a guide to solving aviation problems.

With reference to subsidy, ATA points out that in calendar 1951, 21% of air passenger-miles involved subsidy and air carriers accounted for 51% of the first-class combined air and rail travel market. In 1953, only 8% of domestic air passenger-miles involved subsidized carriers, and the air share of the total first-class market was 65%.

Or, put another way, in 1940 the airlines carried 13% of all first-class passenger-miles—railroad and air—and in 1953 they accounted for 65% of a much larger first-class passenger market. In 1940, the airlines carried just over 10 million airmail ton-miles, while in 1953 they flew just under 73 million.

"These trends do not indicate that direct subsidies are financing diversion of traffic from railroads to airlines," ATA notes. It believes these trends would continue anyhow, and in the same degree. Extensive public usage of air transport "must be accepted as an economic fact of life," and in this Twentieth Century no business is free from the threat, or challenge, of technological change.

"Just as travel has moved from the railroads to fixed-wing airplanes, so the fixed-wing airplane must undoubtedly yield in some measure to the helicopter. Transportation itself may, in some instances, be replaced by improved methods of communication. The use of closed circuit television on theater-size screens allows the conduct of sales promotion and training programs on a large scale without actually transporting people from several locations to a company headquarters. It is clear that as succeeding technological developments produce faster and more convenient transportation and communication media, the older media must adjust their operations to meet these new conditions rather than seek to prevent their creation," ATA asserts.

Referring to the rail claim that airports used by airlines are "subsidized" by public authorities, ATA says an airport is a freely used public facility in exactly the same sense as a highway, and its support is drawn from many users, including the concessionaires on the airport. The airlines are only one of many parties supporting airports. Agreements between airlines and airport operators are reached by arms-length bargaining, just as any other private contract, and airport operators can read airline industry financial statements, and vice versa."

ATA also takes up another railroad line of complaint—that the airlines do not pay for the federal airways system. "Again, this system is identical to public highways—open to users on a first-come-first-served basis, except for the military who command various priorities and operational prerogatives. Needless to say, these priorities work to the disadvantage of other users on many occasions," ATA reminds the committee.

"This requirement for use of a public 'way' is one of the inherent characteristics of the airline industry, just as operation over a private 'way' is an inherent characteristic of the railroad industry. Both situations have their advantages and disadvantages. The private 'way' costs more, but its use is controlled for maximum efficiency by the carrier. The public 'way' costs the carrier less, but it has relatively little control over the aggregate use of the system and over the type and location of facilities installed."

The air transport industry already is paying fuel and oil taxes, the traditional user payment to state and federal governments for the cost of highways, to reimburse the federal government for its share of the cost of airways operation, ATA says, and this is at a rate of about $15 million a year—"our fair share of the airways cost."

The most important change in transportation since the last major legislation—the Transportation Act of 1940—is the tremendous increase in private transport "in all media but rail." The motor car not only is the most popular means of intercity passenger transport in the U. S., but its share of the total traffic "is steadily increasing," and advance of toll roads will accelerate this trend, ATA notes.

"The question that should be considered, then is: What adjustments must be made in the operations of the common carriers to accommodate them to, or combat, this private carrier development and what changes in regulatory and promotional policies must be made to encourage common carriers to bring about the desired result?"

These are cogent words, and we trust that the committee, under the leadership of Sinclair Weeks, Secretary of Commerce, will give them the serious consideration they deserve.

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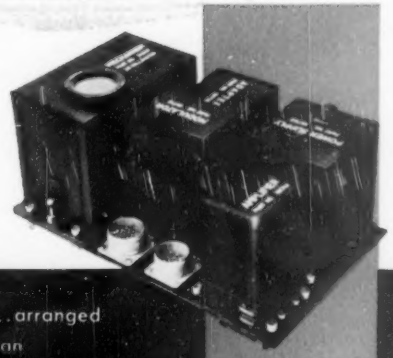

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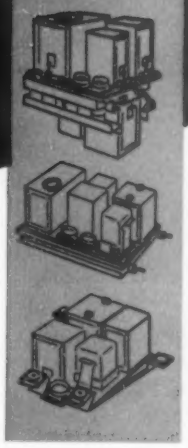

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